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KEY TO PRONUNCIATION.

ä	far, father
ā	fate, hate
a or ă	at, fat
ā	air, care
ạ	ado, sofa
â	all, fall
ch	choose, church
ē	eel, we
e or ĕ	bed, end
ė	her, over: also Fr. *e*, as in *de; eu*, as in *neuf;* and *oeu*, as in *boeuf, coeur;* Ger. ö (or *oe*), as in *ökonomie.*
ę	befall, elope
ë	agent, trident
ff	off, trough
g	gas, get
gw	anguish, guava
h	hat, hot
h or ʜ	Ger. *ch*, as in *nicht, wacht*
hw	what
ī	file, ice
i or ĭ	him, it
î	between e and i, mostly in Oriental final syllables, as, Ferid-ud-din
j	gem, genius
kw	quaint, quite
ṅ	Fr. nasal *m* or *n*, as in *embonpoint, Jean, temps*
ñ	Span. *ñ*, as in *cañon* (căn′yŏn), *piñon* (pēn′yŏn)
ng	mingle, singing
nk	bank, ink
ō	no, open
o or ŏ	not, on
ô	corn, nor
ȯ	atom, symbol
ọ	book, look
oi	oil, soil; also Ger. *eu*, as in *beutel*
ö or oo	fool, rule
ou or ow	allow, bowsprit
s	satisfy, sauce
sh	show, sure
th	thick, thin
ŧh	father, thither
ū	mute, use
u or ŭ	but, us
u̇	pull, put
ü	between u and e, as in Fr. *sur*, Ger. *Müller*
v	of, very
y	(consonantal) yes, young
z	pleasant, rose
zh	azure, pleasure
′(prime), ″(secondary)	accents, to indicate syllabic stress

THE ENCYCLOPEDIA AMERICANA

F

FALSTAFF, fâl'staf, Sir John, a character in Shakespeare's dramas, 'Henry IV,' Parts I and II; 'Henry V' and 'Merry Wives of Windsor,' conspicuous for lying, cowardice, drunkenness, and boastfulness, yet brimming over with wit and geniality.

FALSTAFF, a lyric comedy in three acts, by Giuseppe Verdi (libretto by Arrigo Boito, based on Shakespeare's 'Merry Wives of Windsor'), first produced at Milan 9 Feb. 1893. While it is popularly assumed that the last work of a creative artist is the greatest, this is by no means a safe rule to apply. In Verdi's case, however, it holds true; and to call 'Falstaff' his masterpiece is but another way of saying that it is the greatest operatic work that has come out of Italy. Its freshness and vigor would have been remarkable in a young man. As the creative effort of a man of 80, it is without precedent in the annals of art. In Boito, Verdi found a perfect helpmate. His adaptation of the Shakespearian comedy is masterly and an ideal vehicle for musical treatment. It is arranged in three acts, each with two contrasted scenes. The Shakespearian spirit is admirably preserved, in spite of the necessary condensation of the original. Verdi applied himself to a grateful task with all the strength of his mature powers, with a technique that had grown equal to the highest demands of modern musical development, with a keen sense of delicious humor that here found an ample outlet, and with a surprising spontaneity of invention. That he had not remained untouched by the great expansion of emotional expression in music, for which Wagner was largely responsible, he had already demonstrated in 'Aïda' and 'Othello,' the operas immediately preceding. But it would be a mistake to infer that he had succumbed to the Wagnerian influence. Mozart is the master whom in 'Falstaff' Verdi most strongly recalls — Mozart, the clear-eyed, the buoyant, the free-spirit in music. But Verdi's music is stamped with his own hall-mark from first page to last. It is difficult to refrain from superlatives in discussing 'Falstaff.' It is one of those works, which, on each fresh study, yields new beauties at every turn. The orchestra speaks as one instrument, flexible and expressive, to a degree never surpassed and, indeed, rarely attained. The outstanding characteristic is the irrepressible, rollicking humor, which informs the entire work. It would be fruitless to single out separate parts,— the scenes between Falstaff and his followers, Bardolph and Pistol, his discourse on «honor» (drawn by Boito from 'Henry IV'), the ensembles first of the men, then of the women and then of the two groups together, with fine love episodes between Nan and Fenton worked in and Falstaff's song to Mistress Ford «Quand 'ero paggio,» are a few taken at random. There are no set arias or pieces, only a continuous stream of music. The richest part is the second half of the last act, with its exquisite tone painting and imaginative beauty, reflecting the spirit of the forest and the fairies and sounding a note that was positively new to Italy. As though to show how completely he has mastered all technical problems, Verdi brings the opera to an end with a big choral fugue, a veritable tour de force, the intricacies of which are entirely submerged in the beauty of symphonic and dramatic effect. Victor Maurel was the original «fat knight,» and he brought to American audiences also his fine portrayal of the part in the first production in this country on 4 Feb. 1895. Balfe also wrote an opera 'Falstaff,' first produced in London 19 July 1838; but it is to-day merely a name.

Lewis M. Isaacs.

FALSTER, fâl'stĕr, **Christian**, Danish poet: b. 1 Jan. 1690; d. 24 Oct. 1752. His 'Satires' on his age, modeled on Juvenal, gave him eminent rank among the native poets. He wrote three volumes of 'Philological Amenities or Various Discourses,' containing a mass of highly interesting observations on the affairs of the time.

FALSTER, one of the Danish islands in the Baltic, separated by narrow straits from Zealand on the north, Moen on the northeast and Laaland on the west; area, 183 square miles. It is flat, well watered, richly wooded, and so prolific in fruits that it has been called the «Orchard of Denmark.» The chief products are corn, hemp, sugar beet, hops, cattle, honey and wax. Some shipbuilding is carried on. The capital is Nykjöbing. Pop. 37,460.

FALUN, or FAHLUN, fä'loon, Sweden, town, capital of the county (län) of Kopparberg, on a stream connecting lakes Varp and Runn, 130 miles northwest of Stockholm. What is now included in the town of Falun was once nine little villages. Many of the buildings date from the 14th century; one, an old church of this century, has a green copper roof. It is the seat of a mining school, and it contains a hospital, gymnasium and several other public buildings of note. The town owes its prosperity to the rich copper mines in the vicinity. The mines are worked by one of the oldest trading corporations in Europe, dating from before 1347. Gold and silver are also mined, but the rich «copper mines of Falun» have given to the town the name of «The Treasury of Sweden.» There are manufactures of textiles, leather and rolling stock. Pop. 11,955. Consult Nordenström, ‘L'Industrie Minière de la Suéde’ (1897); Sundbarg, ‘La Suéde, son Peuple et son Industrie.’

FALUNS, fä-luṅ, a French provincial term for the shelly Tertiary (Upper Miocene) strata of Touraine and the Loire. Though generally composed of shelly sand and marl, in some districts they form a soft building stone, chiefly composed of an aggregate of broken shells, bryozoa, corals and echinoderms, united by a calcareous cement. They are found in scattered patches of wide extent, but rarely more than 50 feet in thickness; they have long been known and utilized for their fertilizing properties. The fossils are chiefly marine, but there occur also land and fresh-water shells, and the remains of numerous mammals.

FAMA, fä'mạ, the Roman personification of fame, rumor, reports, news or tidings of any sort, whether good or evil. A graphic description is found in Virgil, where Fama is represented as winged and with as many ears, eyes and tongues as feathers. She is sometimes pictured with a trumpet, either blowing it or holding it in her hand.

FAMAGOSTA, fā-mä-gos'tä, or **FAMAGUSTA**, fā-mä-goos'tä (ancient ARSINOE), a seaport on the island of Cyprus, 40 miles east of Nicosia. Famagosta, during the Venetian régime, was one of the richest and most populous towns in the Levant. The name, Fama Augusta, shows its Roman origin. It is now almost in ruins, with its once fine harbor nearly choked with sand, having declined since its conquest by the Turks in 1571. About five miles northeast are the ruins of Constantia, occupying the site of the ancient Salamis, now called Eski, or Old Famagosta. Guy de Lusignan was here crowned king of Cyprus in 1191. Since Great Britain obtained control of Cyprus, Famagosta has begun to revive in importance. Pop. 5,000. See CYPRUS.

FAMILIAR SPIRIT, one of those demons or evil spirits which were supposed to attend and be at the service of a magician or other favored person. The belief in familiar spirits is very ancient, and by the law of Moses such as had familiar spirits were to be put to death. Where Socrates speaks of his attendant demon, he is generally understood to refer to the inner feelings and promptings of his nature, and not to any familiar spirit. In Eastern countries the belief in familiar spirits is very general. Attendant genii in Oriental tales are represented as sometimes good and sometimes evil. The «slave of the lamp» mentioned in the ‘Arabian Nights’ is a well-known illustration of this superstition. A belief in familiars was widely diffused over Europe in the Middle Ages. Jovius says that Cornelius Agrippa was always accompanied by a devil in the form of a black dog; and Goethe makes Mephistopheles first appear to Faust in this shape. Paracelsus was believed to carry about with him a familiar spirit in the hilt of his sword. See WITCHCRAFT.

FAMILIARITY. See RECOGNITION.

FAMILISTÈRE, fä-mē-lē-stär (Fr.), a community living as one family; a familistery. It is especially used as referring to the community established by Godin in Guise, France. See GUISE.

FAMILISTS, name of a sect founded by Heinrich Nikolaus, which arose in Holland about the middle of the 16th century, and taught that the essence of religion consisted in the feelings of divine love; hence they were otherwise called the Family of Love. They also believed that absolute obedience was due to all constituted authorities.

FAMILY, a category in the classification of animals and of plants, which falls between the narrower «genus» and the broader «group» order. It designates a natural group determined by the common possession of characters of a broader kind than those which determine the limits of a genus, and may be composed of many genera exhibiting the required affinity, or of only a single genus represented by one species. In the former case minor subdivisions may be convenient under the designation *sub-family;* an example of this occurs in *Falconidæ* (q.v.). On the other hand, certain groups of families, forming subdivisions of an order (q.v.), and called *super-families*, are sometimes made. In zoology a group of forms is ranked as a family on considerations of form as expressive of structure. This is sometimes very plain, as in the cat family, or the owl family; but frequently the limits are less easily marked, and the rank remains a subject of dispute pending the decisive results of better information. In zoology the technical name of a family, usually derived from that of its most typical or prominent genus, always ends in *idæ*.

In botany the corresponding category — that is, an assemblage of genera — is more frequently designated a «natural order,» and its taxonomic name always ends in *aceæ*. It is based upon similar appearance and habit of growth and flowering, as the *Ranunculaceæ, Coniferæ*.

FAMILY, History of (Lat., *Familia*, the servants of the household, later, a household). A more or less permanent group of parents and offspring; in human society the group normally comprised of father, mother and children. The word is sometimes used for a much larger group, tracing descent to a common ancestor, that is, a kinship group. See article on MARRIAGE, HISTORY OF.

The Origin and Social Function of the Family.— In the sense of a more or less permanent group of parents and offspring, the family exists to a considerable extent in the animal world below man. Thus it is found beginning with some of the higher fishes, is common among the birds, the higher carnivora and the primates. Strictly speaking, we have a family group only when both parents unite in the care of the offspring. Animal family life apparently owes its origin (1) to the production of «child» or immature forms that need more or less prolonged parental care, and (2) to the parallel development of parental instincts which keep male and female together for care of the offspring. The same general statement holds true regarding the origin of human family life. In other words, the family group is due not to sex, though that is a necessary condition, but to parental care. Both in the animal and in the human world family life is essentially a device for the preservation of offspring through a more or less prolonged immaturity.

Modern sociologists generally agree that in the development of human society and of civilization the family has played a very large part because it is one of the primary social groups. In it are found most of the essential forms of social relationship between individuals. It is characterized by intimate, face-to-face association and by the presence of both sexes and all ages. The family group is usually, therefore, more or less self-sufficing under simple conditions of life, and in all stages of civilization exhibits social life at its maximum intensity. For these reasons, some of the older sociologists, such as Comte, regarded the family rather than the individual as the unit of social organization. While this view is no longer held by modern sociologists, the family in human society must be regarded as the primary social structure, and from both a cultural and moral standpoint as the most important of human institutions.

In present society this primary group performs the following important functions: (1) It continues the life of the species. It determines thereby the child's physical heredity and furnishes the child with physical care and nurture until maturity is reached. (2) It preserves and conserves social possessions. It transmits property from generation to generation and thus furnishes the child largely with his economic equipment for life. More important, however, is its preservation and transmission of the immaterial possessions of society. It is the chief institutional vehicle of tradition in the sociological sense; that is, it is the chief medium of handing down from generation to generation knowledge, standards, values along every cultural line. The child gets, for example, his ideas and standards on government, law, religion and morality largely from the family. (3) The family is the chief generator of altruistic sentiments and ideals in human society. This primary group furnishes the basis upon which such primary ideals as fatherhood, brotherhood, love, service and self-sacrifice have been built up into moral and social traditions. It is, in other words, the chief means of *socializing* both the child and the adult, and forms, as Comte said, a sort of natural transition from the egoism of the individual to the high degree of service and altruism demanded by civilized society.

The Primitive Form of Human Family Life.—There has been much debate about the primitive form of the family in human society. Bachofen, a Swiss writer, in 1861 put forward the theory in his book called 'Mutterrecht' that the original form of sex relation among human beings was that of complete promiscuity. This position was later endorsed by Sir John Lubbock, J. F. McLennan, a Scotch writer, Louis H. Morgan, an American ethnologist, and, with some modification, by Herbert Spencer. This theory of the primitive form of the family is generally rejected by recent sociologists, (1) because a well-developed family life is found among some of the anthropoid apes, man's nearest relative in the animal world; (2) because promiscuity is not found to exist generally among the peoples lowest in point of culture; (3) because the feeling of jealousy in the male would make a condition of promiscuity improbable among early men; (4) because the practice of promiscuity is found to interfere with female fertility and to lessen the birth rate; (5) because the upright attitude of man makes it necessary for the male parent to care for both mother and child before and after the birth of offspring if both are to have the best chance of survival. For these reasons the consensus of sociologists and anthropologists at present is that a primitive stage of promiscuity never existed in the human species, but that the primitive form of human family life was that of a simple pairing monogamy, such as is found among birds, several of the higher animals, and especially among the most man-like of the higher apes, the chimpanzee. By «simple» we mean that the union was instinctive and without the legal, moral and religious sanctions of later ages; by «pairing» we mean that this primitive monogamy was not necessarily of a permanent type, but, as among many animals, lasting often merely through the rearing of offspring. The moralized monogamy of later ages should not be confused with this primitive pairing type of family life, which even yet very generally prevails among the lowest savages, such as the Bushmen of South Africa, the Veddahs of Ceylon, the Andaman Islanders and the Fuegians.

The Maternal Family.—The original type of family in the human species seems to have been of the type which anthropologists and sociologists call «maternal»; that is, the mother is the centre of the family, the children take her name, and if there is property or hereditary titles they pass along the female line, not along the male line. There are various degrees of this maternal family. As a metronymic (mother-name) system there is much evidence to show that once it was universal. Bachofen and McLennan thought that the reason for this was the condition of original promiscuity which we have just discussed. But it is found among many peoples with a highly developed and comparatively stable family life, as, for example, among many of the American Indians. The causes of this system of naming and of reckoning relationship seems to have been (1) that in primitive society the physiological connection between father and child was not known, and hence it was impossible to trace blood relationship along the male line; (2) that in primitive conditions the child was more habitually attached to the mother and the mother's kin than to the father, as on account of hunting and war the latter was a relatively unstable element in the family. This primitive form of tracing blood relationship persisted among many peoples down to recent times. Even among the European peoples in the earliest historic period we sometimes find survivals of the system.

Among well-developed maternal peoples, children not only bear the name of the mother's kinship group or clan, but the husband and father, while usually belonging to another clan, lives with his wife and his wife's people. Sometimes the mother's brothers exercise a certain degree of authority over the children; but there is little evidence to warrant us in believing Bachofen's contention that all of this points to a primitive state in which women were dominant socially and politically. Among many maternal peoples, however, women have a higher social and political status than they came to have under the patriarchal system (q.v.). The maternal system, in other words, was not a true «matriarchate.»

The Historical Development of the Family.— By the time we reach the period of written records among European and Asiatic peoples the maternal form of the family had been left behind and the civilized peoples of Europe and Asia had all developed in varying degrees the paternal family, in which names, property and titles pass along the male line and the father is the head of the household. The main causes of this transition to the paternal system seem to have been wife capture in war, wife purchase and the pastoral system of industry. (See article on Patriarchal System). Chinese, Hindus, Hebrews, Greeks, Romans and even the barbarous Teutonic tribes had all, indeed, early in antiquity developed the extreme type of the paternal family which we call «patriarchal.» We have space to notice only the historical development of the family among those ancient peoples whose civilization has formed the basis of our own, namely, the Hebrews, the Greeks, the Romans and the Teutonic tribes.

Family Life of the Ancient Hebrews.— Hebrew family life was of the patriarchal type as far back as we have any certain knowledge, though Robertson Smith thinks that there are indications of a pre-existing maternal family. The descriptions in the Old Testament are, indeed, perfect pictures of the patriarchal type of family life. Polygamy (see article on Marriage, History of) was practised by the patriarchs, but monogamy was the prevalent form of family life among the masses of the people, and after the Captivity was practically the only form. Women, especially those who were wives and mothers, held a relatively high position in the Hebrew family and society, though they had no legal rights. Children were regarded as blessings and were greatly desired on account of the patriarchal system. No exposure of children was apparently practised by the ancient Hebrews. The family was practically among them a religious organization, though they left ancestor worship behind before they appear in history. From the Hebrew family life was derived practically all of the ethical and religious phraseology of ancient Judaism. It is through the ethical and religious ideas derived from their family life that the ancient Hebrews have particularly affected the family in modern civilization. The relative purity and integrity of the Hebrew family, however, was not maintained after contact with Greco-Roman civilization. In New Testament times divorce, which originally had been very rare among the Hebrews and granted only for adultery and barreness, became very common.

Greco-Roman Family Life.—As among the Hebrews the family among the earliest Greco-Romans was practically a religious institution, designed to maintain the worship of ancestors. The family was of the extreme patriarchal type, the head of the family or patriarch, as the link between the living and the dead, was considered almost divine. His power over the patriarchal group was accordingly in theory absolute, though in practice it was limited by many religious scruples. Marriage was regarded as a religious bond, and among the early Romans was strictly of the monogamic type, though polygamy is recorded occasionally among the Greeks. As the marriage bond was religious it was practically indissoluble and divorce was very rare, especially among the early Romans. Among the Romans the patriarchal family line was kept up by resort to the practice of adoption. Although women had no legal rights, the position of wife and mother, especially among the early Romans, was singularly high and respected. Among the Greeks, however, the position of women, probably owing to Oriental influences, was less favorable, and the respectable Athenian wife and mother was supposed to remain secluded in her household.

This relatively high and stable form of the family among the Greeks and Romans began early to decay, especially among the Greeks. After the conquest of Greece by Rome the decay spread rapidly to Roman society. Marriages began to be formed upon a contract basis and the relationships of the sexes became very unstable. Later Greco-Roman family life was extremely demoralized, and in urban centres, especially in Rome, from the 1st to the 3d centuries A.D., there was a close approach to a condition of general promiscuity in sex relations.

Family Life of the Ancient Germans.—The family life of the ancient Teutonic tribesman seems to have conformed to the same general type as that of the early Greeks and Romans, only it was much cruder. The patriarchal family existed, but it was much less fully developed, and there were survivals of the maternal system. The wife was regarded, as among all patriarchal peoples, as the property of her husband, who theoretically had the right to sell wife and children. Yet women held a relatively high position, as Tacitus, their earliest historian, testifies. There was little polygamy practised, and divorce was very rare. The ancient German family was, then, of a crude but of a relatively pure and stable type.

Effect of Christianity on the Family.—The early Christian Church made one of its first tasks the reconstituting of the family life, which, as we have seen, was demoralized in later Greco-Roman civilization, upon a pure and stable basis. It early sought to limit and abolish divorce. This it practically accomplished about the 12th century A.D., through the recognition of marriage as one of the church sacraments, making marriage again a religious bond. At the same time it endeavored to lessen prostitution, to put a stop to the exposure of children and to exalt the position of women. In all of these endeavors it was more or less successful. Unfortunately, the type of family life which it set up, however, was patterned after the patriarchal type found among the Hebrews and in early Greece and Rome. Thus women were again subjected and deprived largely of the legal rights which they had won to some extent under Roman law.

This religious authoritative family persisted down to the Reformation, and practically even to very recent times. The Protestant reformers, however, recognized that marriage was a civil relation, created by the state and only to be broken by the state. From this arose the civil marriage laws of modern European states. In the 18th and 19th centuries, however, the view again grew up that the basis of the family was essentially private contract, marriage being made and broken by mutual consent of the parties.

Partly as a result of this contract view of marriage and the family, but even more largely because of certain general social and economic conditions, the family life in many nations of the present has become very unstable. The religious view of the family has apparently lost its hold among large masses of the population of many countries in Europe and in America. The recent history of the family, therefore, centres largely about the question of divorce (see article on DIVORCE) and the toleration of other forms of the family than permanent monogamy in moral and legal standards. See article on MARRIAGE, HISTORY OF.

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FAMILY COMPACT, (1) the name given to a compact organized by the Duc de Choiseul, first minister of Louis XV, between the various members of the Bourbon family, then sovereigns of France, Spain, the Two Sicilies, Parma and Piacenza, mutually to guarantee each other's possessions. It was signed 15 Aug. 1761. It entailed on Spain a war with England, then at war with France. Other similar agreements, between France and Spain, signed 1721, 1733 and 1743, bear the same name. (2) The nickname given to the group of ultra-Tory leaders who, allied not so much by family ties as by the bonds of political, social and religious sympathies, held a monopoly of place and power in Upper Canada from the formation of the province in 1791 almost up to the union with Lower Canada in 1841.

FAMILY LAW. Speaking of the superiority of the historic method of investigation over the prevalent modes of inquiring into juristic facts, Sir Henry Maine remarked the persistency of social institutions, saying, that to this day «we are in the midst of legal notions, which are nothing more than the same (ancient) conceptions, though disguised by the phraseology and by the habits of thought belonging to modern times.» The antiquity of the family is not even thus disguised. The names whereby the members of a family group are called, and their relationship to one another is indicated, are traceable back to a past which lies far beyond any historic record, and far beyond even the era of legends and myths. The words «father,» «mother,» «sister,» «brother,» «daughter» and their cognates in other Indo-European languages are derivatives of Aryan prototypes designating identical family relationships. Even names indicating more remote degrees of kinship, whether of blood or merely in law, have been traced by comparative philology to a common linguistic origin. The conclusion is inevitable, therefore, that the family not only existed, but was organized on the same general plan as now, while the remote ancestors of the Hindus, Persians, Greeks, Latins, Celts, Teutons and Slavs still dwelt together as one nation and spoke one speech. One should not think of the ancient family as constituted of members of a single household living under one roof; neither is it to be understood as that larger aggregation of blood relations, which we call a «family,» using the word in the sense of a «house» or *gens*, as the Romans called it. The ancient family included all of the descendants, in the male line of descent, from a common, living male ancestor. This ancestor was the *pater familias* — literally «family father,» though, in fact, he might be the grandfather or great-grandfather of the younger members of the family group. Persons legally adopted into a family stood on exactly the same footing with persons born in it; persons adopted out ceased to be members of the family of their birth and became members of the family to which they had been legally united. Families, not persons, were the units of society; early law took little account of individuals. There was a community of interest among the members in the family possessions, and an injury to the person of any one member was avenged by the kindred. The *pater familias* was clothed with extraordinary authority.

Rome.— In the Roman Commonwealth, where the primitive family organization and administration persisted as anachronisms in the midst of a highly complex civilization, the *patria potestas*, or «power of the father,» was despotic almost beyond belief. The *pater familias* had the uncontrolled right to dispose of the persons under his power. He could provide a male descendant with a wife; he could give his daughter or a son's daughter in marriage; he could divorce his children of either sex; he could sell his children or give them to another family head for adoption, subject them to corporal punishment without limit, and he could put them to death. Children under paternal power could hold no property apart from the parent; the latter was entitled to all they earned or acquired; and on the father devolved all the benefits of his sons' contracts free of any compensatory obligations. The arrival of a son at man's estate did not liberate him from the paternal despotism. The son might be married and preside over a separate household and still remain completely dependent. The *patria potestas*, however, could not prevail over the *jus publicum*. Father and son voted together in the *comitia;* they fought side by side in the wars of the republic, where the son might command the father as his superior officer — or the son, as a public magistrate, might decide a lawsuit against the father and even impose a penalty on him for a criminal offense. In all times, however, influences must have been at work to ameliorate the domestic despotism. Natural love and affection could not fail to soften paternal severity. The fear of social ostracism, no doubt, would have deterred a father from an extreme exercise of power over a son, who occupied a high position in the service of the state or in the esteem of the public. There were legal devices whereby a *filius familias* (a son under power) could obtain his emancipation, and it was not an uncommon practice for a father to voluntarily emancipate a son. Under the empire the *patria potestas* was gradually weakened. The uncontrolled right to inflict corporal chastisement was reduced to a privilege to bring the domestic offenses of children to the notice of the public magistrates — the punishment of offenses against the public law, of course, was never in the paternal power. The dictation of the father in the marital affairs of the children became a conditional right of veto; an adoption could not be effected without the consent of the child to be adopted, and the right to sell children was abolished. This was an approximation to the modern law so far as the rights of persons were concerned. With respect to property, the father's absolute right of control was preserved to the end. The furthest concessions made by the later law was to limit to a life interest the father's right to property inherited by children from their mother and to property acquired by children otherwise than by inheritance.

On the death of the father the dignity and power of a *pater familias* devolved upon each son who had attained his majority — and who had acquired sons, daughters or other descendants over whom he could exercise his authority. Daughters, however, did not gain independence through the demise of the father; women as long as they lived remained under the tutelage of the family in which they were born. If the father died intestate the family property descended to the children in equal shares and, at nearly all periods, without any preference for male heirs. But the children of a daughter, deceased before the death of her father, took nothing in right of their mother — for inheritance by representation could be claimed only through a male progenitor. Though daughters shared in the paternal estate equally with the sons, the legal disabilities of women involved the necessity of creating trusteeships and guardianships for them. In default of direct descendants the nearest agnatic kindred became the heirs and, these also failing, the estate was distributed among the *gentiles*, meaning, the whole body of citizens bearing the intestate's family name. These constituted the *gens* or "house," and were assumed to be kindred in blood, though this kinship was a legal fiction more often than it was a fact. Only those children of an intestate who were under power were capable of inheriting from an intestate. An emancipated son inherited nothing. The act of emancipation, intended as a mark of distinction and proof of special fatherly affection, would react disastrously by disinheriting the favorite. This possibility was avoidable only by a testamentary disposition. The unfairness of a law, which permitted a family domain to pass to strangers and to be dissipated by a division into a very large number of very small parts, explains the Roman aversion to intestacy — an aversion which continued long after its original cause had been removed. An ancient will should not be conceived as an instrument, like its modern counterpart, made in secret and kept secret until the death of the testator. On the contrary a Roman will could be made only with the fullest publicity and with the approval of the community. This approval was attested by a cloud of witnesses, originally, the *comitia calata*, which was the whole body of citizens drawn up in battle array. The reason for this elaborate ceremonial was not a fear that a testator might disinherit his natural heirs; but the purpose of a will being to defeat the claim of the *gens* to an escheat, it would have been contrary to then prevalent ideas to permit so important a public act to be done without the demonstrative co-operation of the entire community. Doubtless, an attempt on the part of a father to deprive his children of their patrimony would have failed to receive the necessary public approval; but no testator would have thought of making such an attempt. Later on, when the formal probate of a will had become less public and less imposing, "the plaint of an undutious testament" would be entertained by the *prætor* and be the means of reinstating heirs unjustifiably excluded from their heritage. A will went into effect immediately upon its publication and approval; and, though usually made in expectation of death, the testator remained divested of his property even if he recovered. If it created a universal succession — a usual method of testamentary disposition — the effect was that of a general assignment. A universal heir, like a general assignee, or an executor or administrator, took not only the assets of an estate, but assumed the debts and other obligations as well. He assumed also the duty of distributing the remainder to those who had equitable interests in the property.

The Teutonic Tribes.— When the Teuton tribes emerged from Cimmerian darkness and came into the light of history the family, with them, as with the Romans, was the social unit. The kindred and their patrimony were under the *mund* (guardianship) of the living, common male ancestor. This guardianship, however, carried with it the paternal power only in a greatly modified form. The sons were emancipated from paternal control of their persons when they attained their majority, but women remained under perpetual guardianship, which passed on their father's death to their nearest male relative. It did not pass, as in modern times, to the husband on marriage. The community of ownership in family property was pronounced. The *allod,* or family domain, was held in common by the father and his sons, and the former could not alienate the same without the consent of the latter, though the Anglo-Saxon law seems to have been exceptional in giving the father the right of disposition. Wills and testamentary dispositions of property were unknown. The patrimony passed from father to sons in equal shares, but it was not usually divided. While the rule of primogeniture did not prevail, the quasi-corporate character of the family in its relation to property required some sort of managing directorship. It was not unnatural that this should fall to the eldest son on the demise of the father. The rights and persons of women were in the wardship of the family. A distinction was made between inherited and acquired property, the acquisitions of a son who had attained his majority being his own and free of parental control — though the acquired property would be subject to the rights of the sons of him who had acquired the same. Important arrangements respecting property, or marriages were compacts between families, not between individuals — each party acting through the family head in a representative capacity. We still speak of a conveyance of land as a covenant, not between the parties alone but also their heirs and successors forever. Until quite modern times a contract of marriage was referred to as a treaty, and the resulting bond is still called a family alliance. By the time the Goths, Saxons and Franks had become firmly established in their new seats within the territorial limits of the decadent empire, the family law of Rome had attained its final development. Property continued to be held by children, during the life of the father, only by a most precarious tenure. The control of the *pater familias* over the persons and liberties of his children, however, was now ended when they had attained their majority; the perpetual tutelage of women had been extinct for several centuries. Wills were attested by the seals of seven, instead of by the acclaim of an armed host of witnesses. The great number of laws to prevent the disinheritance of natural heirs, or the unequal distribution of estates, might give the impression that such practices were common. As a matter of fact, attempts to divert the patrimony from the natural line of succession were so infrequent that the preventive edicts should be regarded as recording prevalent ideas of right, rather than as enjoining existing evil practices. The rules of intestate succession had been made to conform with natural justice, and the Roman tables of consanguinity have become the basis of our own statutes of distribution. The provisions of the French *code civil* and other modern codes, which require an equitable partition of estates and forbid the complete disinheritance of any child, have their origin in the Roman law of this period.

The Christian Church.— The Christian churches quite naturally succeeded the heathen temples as depositories of wills. The universal succession was adapted, in principle, to cases of intestacy by the settlement of estates through administrators. A good part of the family law of Rome in its ultimate stage of development was absorbed without change into the customary law of the nations of Western Europe, not without the exertion of influence by the Church. A little later the Church succeeded in imposing on these customary laws the right of the widow to her thirds. The Church also assumed the probation of wills and the administration of intestate estates.

A distinction, which still persists, was made by the feudal law between real and personal property. The rules of primogeniture and entail were at first forced upon weak sovereigns by the more powerful of their vassals, who compelled the feeble grantors to write these rules into the charters or deeds creating the feudal benefices. The conditions of the grant were then confirmed by *pactes de famille* (family settlements or house laws) and, finally, the rules were embodied in the customary or common law. The power to sell or devise land freely by will was attained only after several centuries of struggle in courts and parliaments; and from the great landowners came the most determined opposition to the proposal to relieve their property from feudal bondage. The restrictions upon the conveyance of land were not considered a hardship by them. As Sir Henry Maine remarks: «Into the preference for primogeniture there entered no idea of disinheriting all the children in favor of one. Everybody would have suffered by the partition of the estate; everybody gained by its consolidation. The family grew stronger by concentration of power; and it is not likely that the son invested with the inheritance had any advantages over his brethren in occupation, interests and indulgences.» The situation of the holder of a feudal estate cannot be fairly compared with that of the eldest son under a modern English «strict settlement.» The distinction between rights of inheritance to real and personal property has practically disappeared from the family law of this and nearly all other Western nations. The English law is exceptional in that respect, though in this country, as in England, real estate descends directly to the heirs, while personal property passes to the next of kin or legatees through the administrator or executor. But the rules of intestate succession in this country are practically the same with respect to both kinds of property. One rule of the Roman law has not generally prevailed, namely, that which excludes from the succession descendants claiming through female ancestors. The children of a deceased sister by our law have the same rights as the children of a deceased brother; children of the half blood stand in the same relationship to each other as full brothers and sisters do, even though their common parent be the mother and not the father.

Modern Legislative Modifications.— In the modern family law one comes face to face with reminiscences of the old order at every turn. The father is the natural guardian of his children and during their minority he has control over their persons and of their property, except such property as is held in other hands under a trust. The father may restrain the liberty of the children or administer corporal punishment; but such restraint and chastisement must not be excessive or cruel. Until quite recently a father had the power to bind out his sons as apprentices and, though this right has been generally discontinued, the father is still entitled to the earnings of his minor children. Theoretically he is also entitled to the earnings of an unmarried daughter of full age, who is a member of his household and not independently engaged in business nor in a separate lucrative employment. Until restrained by child labor laws of comparatively recent enactment, the father was empowered to hire out his children of any age, even the tenderest, and collect their earnings, subject only to the intervention, often ineffective, of the Society for the Prevention of Cruelty to Children, if one existed in the vicinity. The father has no control, other than moral or persuasive, over the marital arrangements of his grown children; though the power of the father to disinherit is very apt to be a very strong influence against inviting his displeasure. Solemnizations of marriages (or the issue of licenses to marry) in the cases of minors are generally forbidden by law, unless the parental consent have been given; and such marriages are voidable at the instance of the parent. Marriages without parental consent, of children under certain legally defined ages, are nullities. The duty of a father to educate his children has, in general, been taken over by the state; but in most places the parent is under legal compulsion to send his children of school age either to the schools publicly provided or give them some other and equivalent educational advantages. The obligation to support his minor and dependent children is enforcible against an unduteous parent by criminal process. Formerly the father had an absolute right to the property of a deceased minor child and, where the rule has not been altered by legislation, he still has this right. The statutes of distribution usually apportion the shares of the next of kin and some of them include the father. In any event, the father would have the first right to administration of the estate of a minor child. The right of the father to the custody of his children is absolute only under normal conditions. Where the family has been disrupted, or the father is not a proper custodian, equity and statutory law intervene to protect the interests and welfare of the child. The latter in some instances is given the right to express its preference between the guardianship of its mother or father. The duty of the child is to obey its parents, and for incorrigible misconduct the father (or mother) may have a child committed to a correctional institution. Parents, under supervision of a competent court, may surrender their children for adoption. In New Jersey the State Board of Children's Guardians has a general supervisory power over adoptions. The duty to care for indigent, incapacitated and dependent parents is imposed on children capable of doing so, and is enforcible by summary criminal process. In some States the duty to support is extended through two generations, so that the obligation may be enforced in behalf of grandparents against grandchildren, and vice-versa.

The power of a father (or mother) to disinherit children by will is absolute. The child can be cut off without even the proverbial shilling. This is not the case in France and other countries where the Roman law has been more closely followed. With us the human law leaves the matter entirely to the regulation of the natural law of affection. But the birth of a child subsequently to the making of a will, and not provided for therein, has the effect of invalidating the same. Where the inheritance has been diverted from the natural heirs by undue influence or fraud, or where the maker of the will lacked testamentary capacity, the remedy is a contest of the probate of the instrument. Deathbed legacies and bequests in favor of religious, charitable and other foundations, which divert a family estate from those equitably entitled, are void. In case of the father's intestacy the patrimony, exclusive of the widow's share, goes to the children in equal parts, irrespective of sex. Where there are no descendants the estate ascends, so to speak, passing to the grandfather and, through him, to collateral relatives in accordance with their varying degrees of consanguinity. A decedent's brothers and sisters stand in the second degree, because they would claim through the common ancestor (their father) and not directly from their brother. Nephews and nieces are consanguine to their uncle or aunt in the third degree, and cousins german stand in the fourth degree toward each other. The lifelong tutelage of women to the father or other males of the family in which they were born, abolished in the later days of the Roman Empire, was revived in an accentuated form by the barbarian conquerors. There was superadded the theory of the merger of the wife's personality in that of her husband; and many centuries had to elapse before equity and, later on, the statute law delivered women from their condition of legal nonentity — but even the Married Women's Property Acts have left traces of the former disabilities of wives. When a woman becomes the head of a family in consequence of the death of her husband she succeeds to the powers and, also, the obligations of the paterfamilias. A few judicial definitions of the term «family» may not be without interest. Under the Homestead and Exemption laws, it has been held that the term «family» includes a household composed of parents and children or other relatives, or domestics and servants. But a mere aggregation of persons residing in the same house does not constitute a family; there must be an obligation on the part of the head of the house to support the others, or some of them, and a corresponding state of dependence on the part of those supported. Where a death benefit is payable to the «family,» the word means next of kin or those entitled to inherit in the case of intestacy. It was a principle of the common law that a family, in its collective capacity, could not inherit, and a bequest to a «family» was void for uncertainty. A different rule prevails in equity, and a bequest by a father in trust for the benefit of his children and their families was declared to be in favor of the testator's sons and daughters and the latter's children, so long as they live together as members of their parents' households, or from their tender years are entitled to support. Generally speaking the term «family» in a bequest includes the testator's wife and children; but where the will is made by a wife the husband is not considered a member of her family, because he is neither next of kin nor heir to his wife.

Stephen Pfeil.

FAMILY PROTECTION. See Insurance, Fraternal.

FAMINE, a dire want of food affecting considerable numbers of people at the same time. Irregular rainfalls in tropical climates, imperfect methods of irrigation, or the too exclusive dependence of the mass of the people on a single article of food which happens to fail, are among the commonest causes of famines. In the early and mediæval ages they were frequent. The year 879 was one of universal suffering from lack of food. The famine of 1125 diminished the population of Germany one-half. All through the Middle Ages public opinion upheld the city authorities in driving out of the gates the neediest inhabitants and letting them perish. In a famine which devastated Hungary in 1505 parents who killed and ate their children were not punished. It was after a famine of 1586 that the poor law in England had its beginning. As late as the middle of the 17th century famines were a common affliction in Europe and even in the 18th century they still occurred. The last time a period of bad harvests was designated as a famine in Germany was in 1817. The rapidity of modern communication and transport has made severe famine almost impossible in western or central Europe or North America. In Ireland, famines more or less serious have at various times prevailed owing to failure of the potato crop. In 1846 the dearth was so great that £10,000,000 sterling were voted by Parliament for relief of the sufferers. India has long been subject to great famines, and the government's budget makes annual provision against such need. Under the rule of the English, the population has greatly increased, and as the majority of people live from hand to mouth in ordinary times, the slightest failure in the rice crop causes the famine point to be immediately reached. In 1769–70 as many as 3,000,000 perished; in 1865–66 about 1,500,000, and in 1877 about 500,000. The authorities grappled very successfully with the famines of 1896–97 and 1899–1901 which extended over large areas, yet there was great loss of life. The recent famine in India cost the government in 1900–01 $250,000,000, of which amount $50,000,000 was expended in direct relief. Much help was sent from other countries, including very large contributions from the United States. In 1870–72 Persia lost 1,500,000 inhabitants, a quarter of the whole population. In China 9,500,000 are said to have perished in 1877–78 from famine. In the northern provinces of Shensi, Shansi and Honan, with a population of 56,000,000, during the years following 1877 it was reckoned that between 4,000,000 and 6,000,000 people perished, and famine visited the empire in 1903. In the famine of 1891–92 in Russia it was estimated that in 18 provinces 27,000,000 of inhabitants were affected. Although many of the causes of famine are beyond human control, it is probable that the extension of sound agricultural knowledge and the adoption of a more rational system as regards the kinds and quantities of crops grown will in the future render famine almost unknown in most countries.

FAMINE FEVER. See Relapsing Fever.

FAMINTZIN, fa-min'tsĕn, **Andrei Sergeyevitch,** Russian botanist: b. Sokolniki, 1835. He was educated at the University of Saint Petersburg. In 1872 he was appointed to the chair of botany at his *alma mater*. He made important investigations regarding the development of seed-plant embryos in which field he was a pioneer. He published 'Embryologische Studien' (1879); 'Studies of Crystals and Crystallite' (1884); 'Uebersicht über die Leistungen auf dem Gebiet der Botanik in Russland' (1894), also articles issued in publications of the Saint Petersburg Academy.

FAMOUS PAINTINGS. See Paintings of the Great Masters.

FAN-CHENG, făn-cheng', China, city in the province of Hu-peh, on the Hankiang, 380 miles west of Nanking. It is located on one of the principal trade routes between the northern and southern provinces of China. Pop. 100,000.

FAN CORAL, the spreading fan-like growths of corals of the family *Gorgonidæ*. The coral stock is here horny or calcareous and takes a bushy growth, or frequently spreads from its base into a flat network, making a "sea-fan." In this coral the short calicles of the single tractile polyps stand perpendicularly to the axis, in which run communicating canals. These alcyonarians are numerous not only in the tropics, one beautiful red or yellow species (*Rhipidogorgia flabellum*) flourishing along the coast of Florida, but also in the deep cold waters of the north Atlantic.

FAN CRICKET, a British name for the mole-cricket.

FAN PALM, a name common to all those palms which have fan-shaped (flabellate) leaves, but more particularly applied to those of the genus *Chamærops*, of which a common species in the Mediterranean region is *C. humilis*. The East Indian "great" fan palms are species of *Corypha*, one of which is the taliput-palm (*C. umbraculifera*), whose leaves furnish the "palmleaf fans" of commerce. The West Indian fan palm is *Inodes blackburniana*.

FAN-TRACERY, in architecture, the decorative tracery on the surface of fan vaulting. It was used in late pointed work. Fan vaulting or fan-tracery vaulting is a very complicated mode of roofing or vaulting in which the vault is covered with fan-tracery. It is peculiar to English Gothic. There are 25 examples of it, the finest of which are to be seen in King's College, Cambridge, Henry VII's Chapel, Westminster, and Saint George's Chapel, Windsor. Consult Bond, 'English Church Architecture' (1913).

FAN VAULTING. See Vaulting.

FANARIOTS. See Phanariots.

FANATICISM, excessive zeal; unreasoning enthusiasm in religious matters. In ancient Rome the term fanatics was applied to such as passed their time in temples, and who, pretending to be inspired by the divinity, would burst into wild and frantic gestures, utter pretended prophecies, cut themselves with knives, etc. It has prevailed under different forms in all ages of the world; and one of its most remarkable and dangerous features is the tendency that it has to spread over large masses of people, as well as to favor measures of persecution. By an extension of the term it is also sometimes applied to other forms of extravagant enthusiasm which in their outward manifestation are accompanied with impetuosity and violence. Thus, we speak of political fanaticism, which, in affairs of state, displays itself in a violent and intolerant partisanship. Not unfrequently both kinds of fanaticism are found combined, and to this combination most of the religious wars which have desolated kingdoms are to be ascribed.

FANDANGO, a lively and voluptuous Spanish dance in triple time, said to be derived from the Moors. It is danced by two persons, male and female, and accompanied by the sounds of the guitar. The dancers have castanets which they beat in time to the measure, though sometimes the male dancer beats a tambourine.

FANEUIL, fan'el, or fun'el, **Peter,** American merchant: b. of a French Huguenot family, New Rochelle, N. Y., 1700; d. Boston, 3 March 1743. The project of erecting a public market-house in Boston had already been discussed for some years, when in 1740 Faneuil offered, at a public meeting, to build a suitable edifice at his own cost, as a gift to the town; but so strong was the opposition to market-houses that, although a vote of thanks was passed unanimously, the offer was accepted by a majority of only seven. The building was commenced in Dock Square in September of the same year, and finished in two years. It comprised a market-house on the ground floor, and a town hall with other rooms over it. See Faneuil Hall.

FANEUIL HALL («The Cradle of Liberty»), in Dock Square, Boston. There being no public market in Boston in 1740, Peter Faneuil offered to build one and give it to the city. It was finished in 1742 — a two-story brick building 100 by 40 containing not only a market in the basement, but rooms for town officers and a public hall for town meetings. It was destroyed by fire 13 Jan. 1761; rebuilt 1763, and in 1775, during the English occupation of Boston, was used for a theatre. It was the meeting place of the patriots during the Revolutionary period, and thus gained for itself the title of «the cradle of American liberty.» In 1805 it was doubled in size by adding a third story and moving a side wall back 40 feet, making the great hall (it holds 3,000 people) famous for the speeches of Webster, Choate, Sumner, Wendell Phillips, Everett and others. The building is still used both for hall and market; the former contains some fine paintings, including Healy's ‘Webster Replying to Hayne.’ Consult Brown, ‘Faneuil Hall and Market’ (1901).

FANFANI, Pietro, pē-ä-trō făn-fä'nē, Italian philologist, humorist and novelist: b. Pistoia, Italy, 21 April 1815; d. Florence, 4 March 1879. He founded in 1847 the *Philological Record*, and afterward edited several other periodicals of a like character. His ‘Vocabulary of Tuscan Usage’ and other «vocabularies» are works of high authority. The ‘Writ at Random,’ and the whimsical satire, ‘The Laughing Democritus: Literary Recreations,’ furnish examples of his brimming humor. His novels are ‘Cecco of Ascoli’; ‘Paolina’; ‘The Coachman and his Family,’ etc.

FANFARE, in music, a short passage for trumpets especially used on occasions of state ceremonial. Certain flourishes in opera music are also called fanfares. Also any short, prominent passage of the brass instruments of an orchestra.

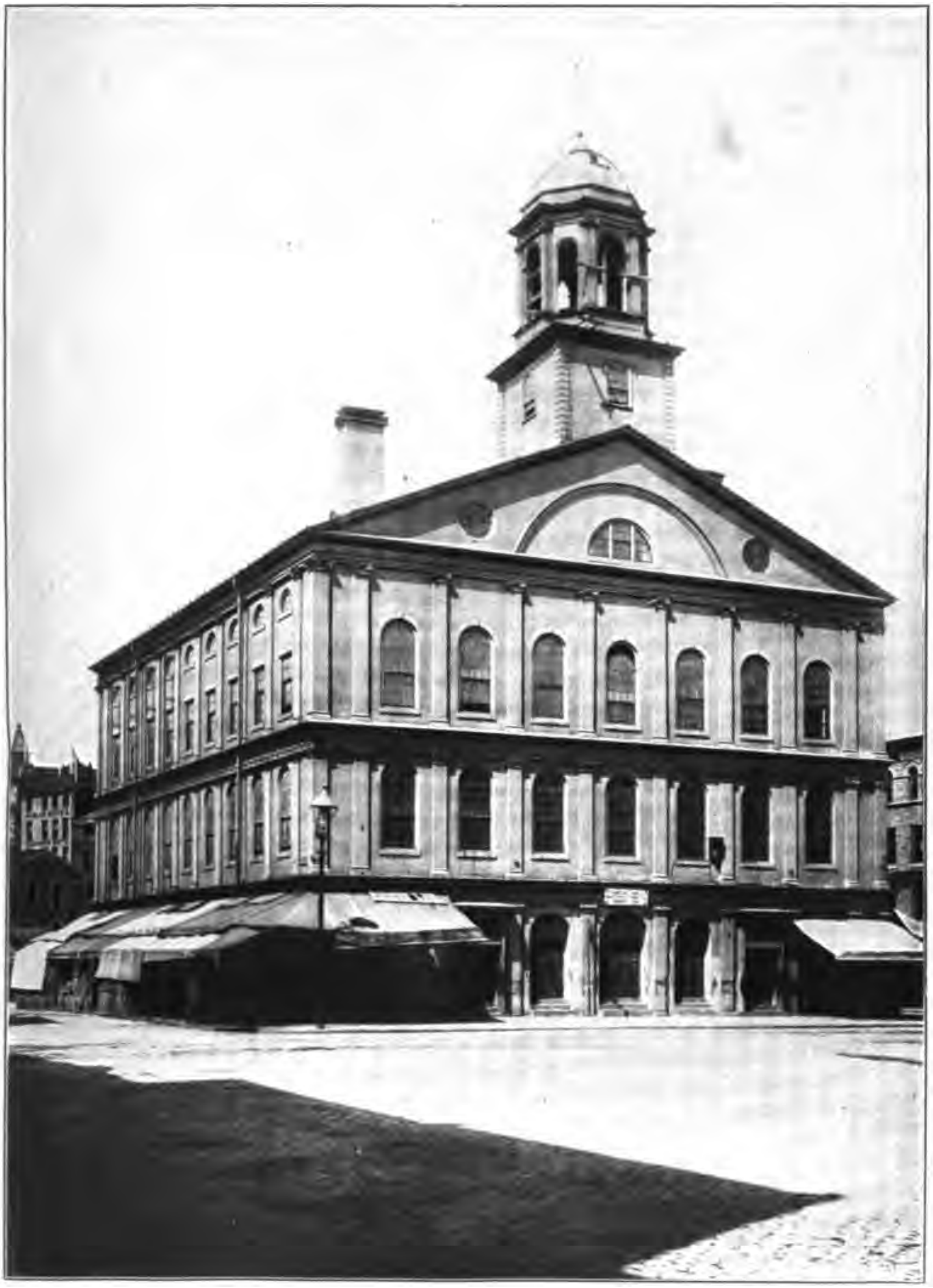
FANGWE. See Fans, a tribe.

FANNIN, James W., American soldier: b. Georgia, about 1800; d. Goliad, Tex., 27 March 1836. He removed to Texas in 1834 and in the Texas war of independence raised the «Brazos Volunteers,» a company which formed part of the army of General Austin. Receiving orders from General Houston to blow up the fort at Goliad and retire to Victoria he was attacked on the banks of Coleto Creek as he was retreating with women and children and a force of 350 men. The Mexicans were 1,200 strong and after a battle of two days' duration he surrendered. Santa Anna instead of paroling the Americans, in accordance with the promise of General Urrea, gave orders that all, excepting the women and children, should be shot.

FANNING, David, American freebooter: b. Wake County, N. C., about 1756; d. Digby, Nova Scotia, 1825. He was a carpenter by trade, but led a vagabond life. Late in the Revolutionary War he joined the Tories for the purpose of revenge; gathered a small band of desperadoes like himself, laid waste to whole settlements and committed fearful atrocities. For these services he received a lieutenant's commission from the British commander at Wilmington. At one time he surprised a court in session and captured and carried off judges, lawyers, clients, officers and citizens, and soon afterward seized Governor Burke and his suite. The name of Fanning became a terror to the country, and he was outlawed. At the close of the war he fled to New Brunswick, where he became a member of the legislature.

FANNING, Edmund, American loyalist: b. Long Island, N. Y., 1737; d. London, England, 28 Feb. 1818. He was graduated from Yale in 1757; settled in North Carolina, where he became a member of the legislature, and as recorder for Orange County excited general dislike by his exactions. In 1771 he removed to New York, in 1774 was appointed surveyor-general, in 1777 organized the king's American regiment of foot. He was wounded during the Revolutionary War and in 1779 his property was confiscated. He was subsequently (1783–86) lieutenant-governor of Nova Scotia and was lieutenant-governor of Prince Edward Island 1786–1804. In the English army he rose to the rank of general.

FANNING, John Thomas, American civil and hydraulic engineer: b. Norwich, Conn., 31 Dec. 1837; d. 1911. He was educated in public and normal schools, studied engineering and architecture, and had begun to practise engineering in his native town when the Civil War broke out. He enlisted and attained the rank of lieutenant-colonel. At the close of the war he resumed engineering practice in Norwich and soon began to specialize in hydraulics. During the next 10 years he was engineer for a number of municipal waterworks in New England. In 1877 he published ‘A Treatise on Hydraulic and Water Supply Engineering’ which, as the first and for many years the leading American work on that subject, went through many editions and gave the author much prestige. At that time less than 500 cities in the United States had waterworks. He was subsequently employed as consulting engineer for many waterworks plants, municipal and private. In 1885 he made a report on the improvement of water power on the Mississippi River at Minneapolis, Minn., and in the following year he was appointed chief engineer of the Saint Anthony Falls Water-Power Company in that city, where he lived until his death. He prepared a comprehensive plan for the drainage of 3,000 square miles of the hard-wheat land in the valley of the Red River of the North; was consulting engineer for many large water-power projects, among which were early plants on the Missouri River, at Great Falls and Helena, Mont., and on the Spokane River at Spokane, Wash., and was also associated as consulting engineer with several of the leading railroad companies of the West. He was for 38 years a member, and in 1910–11 a vice-president of the American Society of Civil Engineers and contributed largely to its Transactions, but as a writer he is best known for the pioneer American treatise already mentioned.



FANEUIL HALL, BOSTON, MASS.

FANNING ISLANDS, a group of coral islands, in the Pacific, between lat. 2° and 5° 49′ N. and long. 157° and 162° W. It comprises the islands of Jarvis, Christmas, Washington, Palmyra and Fanning Island; area of the whole, about 260 square miles. Cocoanut and other tropical trees are found here. The islands of Fanning and Christmas belong to Great Britain; Palmyra is claimed by the United State. Fanning Island is a station on the British «All-Red» cable. Pop. 200. The group gets its name from an American sailor, Edmund Fanning, who discovered it in 1798.

FANNIUS STRABO, Gaius, Roman historian and orator, the son-in-law of Lælius. In his youth he served in Africa under Scipio Africanus, in 146 B.C., and along with Tiberius Gracchus, was the first to mount the walls of Carthage on the capture of the city. He afterwards served in Spain with distinction, in 142 B.C., under Fabius Maximus Servilianus. Fannius is introduced by Cicero as one of the speakers both in his ‹De Republica› and in his treatise ‹De Amicitia.› At the advice of his father-in-law, Lælius, Fannius had attended the lectures of the Stoic philosopher, Panætius. Fannius owed his celebrity in literature to his ‹History.› We have no information respecting the extent of this work; we only know that it treated of contemporary events and that it possessed some merit appears from the fact of Brutus making an abridgment of it. Sallust likewise praises its truth. For the extant fragments consult Peter, ‹Historicorum Romanorum Reliquiæ› (Leipzig 1870).

FANNY FERN. See PARTON, SARAH PAYSON WILLIS.

FANO, fä′nō (ancient FANUM FORTUNÆ), a seaport of Italy, in a rich and fertile plain on the Adriatic, province of Pesaro e Urbino, 29 miles northwest of Ancona. It is surrounded by walls, built by the Emperor Augustus, and contains a triumphal arch, a cathedral with valuable paintings, a public library, orphan asylum and a fine theatre. Since the filling up of the harbor its commercial importance has lessened, but a canal gives access to the Adriatic. Here the first printing press with movable Arabic type was set up in 1514 by Pope Julius II. Pop. of commune 26,928.

FANON, an ecclesiastical term of various applications. It was used to denote the cloth in which the deacon in the ancient or early mediæval Church received the oblations, and is now generally applied to a striped, oblong piece of silk gauze worn on the head and shoulders by the Pope in celebrating mass pontifically. It also designates the church banner carried in processions. In surgery, a fanon is a splint of a particular shape, formerly employed in fractures of the thigh and leg, to keep the bones in contact.

FANS, also known as **FANGWE PAHOUINS, OSHIBA**, etc., an African people who emigrated from the interior to the coast of the French Kongo during the first half of the 19th century. They now number about 300,000 in the neighborhood of the mouths of the Ogoway and the Gaboon. They have been described by Du Chaillu, Burton, Lenz, Reade and other travelers as a warlike and highly intelligent people, differing markedly from the surrounding negroid or Bantu tribes. Linguistically, they are allied with the Bantu group. Their complexion is rather light, their beard long, their frontal bone very prominent and they are tall and well built. They were formerly much given to eating human flesh, but their cannibalistic tendencies have been checked by contact with the Europeans of the coast regions. Consult Tessmann, ‹Die Fangwe› (Berlin 1913).

FANS, instruments for producing an agitation of the air and consisting of an extended flat surface, generally semi-circular in outline. As hand implements for cooling the air they have long been articles of luxury. Early Egyptian paintings prove familiarity with its use in a remote period. From a passage in the ‹Orestes› of Euripides it appears that the Grecian fans were introduced from the East, that they were of a circular form and were mounted plumes of feathers. Dionysius of Halicarnassus describes the courtiers of Aristodemus at Camæ as attended by females bearing parasols and fans. Plautus mentions fan bearers as forming part of a Roman fine lady's retinue, and Suetonius describes Augustus as lying, during the heat of summer, in the shade and fanned by an attendant. In the Middle Ages fans were used in the churches to chase away the flies from the holy elements of the Eucharist. Such a fan, known as a flabellum, is still used in the Greek and Armenian churches. The folding fan is said to have been a Japanese invention which originated in the 7th century, the idea having been supplied by the wing of the bat. From Japan the invention passed to China; but it was not till about the beginning of the 16th century that such fans began to be used in Europe, being introduced into Italy and Spain. The fan was first brought into European notoriety by Catharine de Medici, who introduced it in the folding form into France. Great sums were spent on the ornamentation of the fans first in vogue, and many were painted by Watteau. During the 16th and 17th centuries, they were used by gentlemen. In various nations and at various periods the manipulation of the fan has formed almost a separate language, especially for coquettes. Addison in his essay on the fan, in the *Spectator*, and Disraeli in ‹Contarini Fleming,› treat of this feminine art. They are said to have been introduced into England from Italy in the reign of Henry VIII; and in the reign of Elizabeth they were framed of very costly materials, the body of ostrich feathers, the handle of gold, silver or ivory, of curious workmanship. Walking fans were formerly in use. They were of large size and were employed to screen the face from the sun. The Chinese have greatly excelled in the art of making fans, those of the lacquered variety showing especial skill. For common use they make a cheaper sort, constructed of polished bamboo and paper. In Japan, where to this day the fan is an indispensable adjunct of the daily life of all classes, large rich fans are used in ceremonial dances, in which they are accessories of peculiar significance. In Rome the Pope is escorted on cermonial occasions by attendants with flabella formed of peacock feathers. In Europe, France manufactures the greatest number of fans used by the world of fashion. A species of large fan known as a punkah is used in India for cooling the air of rooms and keeping down the temperature. Fans in the form of machines are used in agriculture for winnowing grain, the original form being very simple and dating back to primitive times. In metallurgy and other branches of manufacture fans are employed for ventilating and stimulating the combustion of fires; for the ventilation of mines; and for various other manufacturing purposes. The modern electric revolving fan is extensively used for cooling the air in public and private buildings. Consult Blondel 'Histoire des éventails' (Paris 1875); Rhead, 'History of the Fan' (London 1910); Salwey, 'Fans of Japan' (ib. 1894); 'Catalogue of the Loan Exhibition of Fans at South Kensington' (ib. 1870).

FANS, Mine. See MINING.

FANSAGA, făn-să′ga, **Cosimo,** Italian artist: b. Bergamo, 1591; d. 1678. At Rome he studied under Pietro Bernini. He worked chiefly in Naples, where he was eminent as architect, painter and sculptor. At Naples he executed the fountain of Medina, the façade of S. Teresa degli Scalzi, the church of S. Maria Maggiore and the Palazzo Maddaloni, now the National Bank, and the cloister and dining hall of San Severino.

FANSHAWE, fan′shâ, **Anne Harrison,** LADY, an English memoirist: b. London, England, 25 March 1625; d. there, 30 Jan. 1680. She was married to Sir Richard Fanshawe (q.v.) in 1644. Her admirably written and accurate observations of life and manners in many lands, preserved in 'Memoirs,' from which extracts have been published, are of historical value.

FANSHAWE, Catherine Maria, English poet: b. Chipstead, Surrey, 6 July 1765; d. Putney Heath, Surrey, 17 April 1834. A lively fancy, brilliant wit, sound sense and personal charm made this lady and her poetry admired in her own circle; but she rarely consented to publication and only her riddle on the letter H, sometimes credited to Byron, is generally known, her stanzas not having been collected.

FANSHAWE, SIR **Richard,** English diplomatist, poet and translator: b. Ware, Hertfordshire, June 1608; d. Madrid, Spain, 26 June 1666. On the breaking out of the civil wars in 1641 he engaged actively in the royalist cause. He was made a baronet in 1650, and sent on an embassy to Spain, and afterward appointed secretary of state for Scotland. He was taken prisoner at the battle of Worcester in 1651. He was elected M.P. for Cambridge University in 1660, and in 1661 and 1662–63 he was employed on two several missions to the court of Lisbon, in the first of which he negotiated the marriage of Charles II with Princess Catharine. In 1664 he was Ambassador to Madrid and negotiated a peace between England and Spain, but having neglected to inform his government that it must either be confirmed by his sovereign within a specified time or withdrawn, he was recalled. His poetical abilities were above mediocrity, as is evinced by his translations of the 'Lusiad' of Camoens, the 'Pastor Fido' of Guarini, the 'Odes' of Horace, and the fourth book of the 'Æneid' into English verse, and Fletcher's 'Faithful Shepherdess' into Latin. His 'Letters' were published in 1724 in the "Memoirs of Lady Fanshawe" (née Ann Harrison).

FANTAIL, an Australian flycatcher of the genus *Rhipidura* having a fan-like, and in some species prolonged tail, which the bird opens and shuts gracefully as it tumbles about in the air when pursuing its agile prey. A familiar species is *R. motacilloides,* whose habits are wagtail-like.

A warbler (*Cisticola cursitans*) of the Mediterranean countries and eastward, remarkable for its nest, which consists of soft materials enclosed in two leaves stitched together to sustain it, much after the method of a tailor-bird (q.v.).

A small variety of domestic pigeon, usually pure white, which holds its tail erect and distended like a fan.

FANTAN, a Chinese form of gambling. It is simple in form and rule. A square is marked in the centre of a table, or a square of metal or wood is laid on it, the sides of which are marked 1, 2, 3, 4. The croupier now places on the table a double handful of small coins or similar articles and covers them with a bowl. The players select their sides and place their stakes near the number chosen. When all four sides have been backed the bowl is removed and the croupier withdraws the coins from the heap, four at a time, till there remain at most four. In this case the backer of number 4 wins, if there be three remaining coins, number 3 is declared winner, and so on. A percentage is now deducted by the croupier and the winner receives five times the amount of his stake less the percentage. There is a card game of this name also, played with a pack of 52 and by any number of players up to eight. The game starts by cutting the cards. Ace high deals to the left, one at a time, the cards left over are placed face downward on the table. Each player puts up a stake called the "ante." The first player on the dealer's left is called on to play an ace, which he places, face upward, in the centre of the table. If he have no ace, he pays an "ante" and takes a card from the stack. The second player is then called on, and so on until an ace is played; thereafter the piles are built up from ace to king. The winner of the pool is the player who first gets rid of all his cards. Failure to play, having a playable card, subjects a player to a fine equalling the amount of the ante for every card remaining in the hands of all the players.

FANTASIA, fan-ta-zē′a, in music, a species of composition in which the author confines himself to no particular form or theme, but ranges as his fancy leads amid various airs and movements. Some writers in defining this word confine its meaning to extempore composition and make this distinction between capriccio and fantasia; namely, that the former is a collection of singular and whimsical ideas strung together by an excited imagination and written down at one's leisure, but the latter is an off-hand execution of whatever comes across the mind while playing on an instrument. In modern usage it is often an enlargement or embellishment of a popular air or operatic melody, arranged for an instrumental solo.

FANTEE, or **FANTI,** făn-tē′, formerly a native state of Africa, on the Gold Coast, which extends about 90 miles along the shore of the Atlantic, and 70 inland; lat. 5° 30′ N.; long. 1° W. The inhabitants, called Fantees, were at one time the most numerous and powerful people situated immediately on the Gold Coast; but their power was almost entirely broken after 1811 by invasions of the Ashantees. Their country is now included in the British Gold Coast Colony. The soil is fertile, producing fruits, maize and tropical vegetation of nearly every variety. The custom of making small scarifications on the upper part of the cheek-bones and the back of the neck prevails among the Fantees. Their government is aristocratic. Their head chief is supreme judge or governor and is attended by a council of old men. Each town has a chief. At one time they had several large cities. The country of the Fantees is populous and prosperous, owing to the protection afforded by the British settlements and particularly by Cape Coast Castle. In 1873 they were again attacked by the Ashantees, who also threatened the British settlements and compelled the government of Great Britain to send out an expedition under Sir Garnet (later Lord) Wolseley to suppress them. Subsequently Ashanti (1896) became a British protectorate, and was annexed in 1901. (See ASHANTI). Consult Barrow, ‘Fifty Years in Western Africa’; Boyle, ‘Through Fanteeland and Coomassii’; McDonald, ‘The Gold Coast Past and Present.’

FANTI, fạn'tē, **Manfredo**, Italian military leader: b. Carpi, 1806; d. Florence, 5 April 1865. He received his education at the military school of Modena and, becoming implicated in the Menotti insurrection, he was condemned to death and hanged in effigy in 1831. He escaped to France and there joined a corps of engineers. With Mazzini in 1833 he took part in the attempted invasion of Savoy, and two years later went to Spain, where for 13 years he served in Queen Christina's armies against the Carlists, gaining distinction after distinction and becoming a member of the general staff. In 1848 he returned to Italy to fight against the Austrians. Being looked upon with suspicion by the Piedmontese officers his success in this campaign was greatly hampered and he was even court-martialled for his operations under Ramorino. Although acquitted he was not again in service until the Crimean expedition of 1855. In the war of 1859 he commanded the second division and was an important factor in the victories of Palestro, Magenta and San Martino. He next organized the army of the Central Italian League (Tuscany, Modena, Parma), numbering 45,000 men and developed it to a high degree of efficiency. He differed with Garibaldi in the matter of the expediency of invading the papal states and Garibaldi resigned. Fanti became Minister of War and Marine under Cavour in 1860 and incorporated the League army with the Piedmontese. After Garibaldi had invaded Sicily and Victor Emmanuel decided to intervene, Fanti was put at the head of a large force with which he took Ancona and other fortresses and inflicted a severe defeat on the papal forces at Castelfidardo, capturing the papal commander, General Lamoricière. In three weeks 28,000 prisoners had been taken and the Marche and Umbria conquered. He now became chief of staff to Victor Emmanuel, organized the siege of Gaeta and defeated the Neapolitans at Mola. Fanti now returned to Turin to reorganize the various army departments. His opposition to the induction of Garibaldi's officers into the regular army with their own grades caused severe adverse criticism. Fanti resigned in 1861 and took command of an army corps. His health had broken down and the last four years of his life were a period of constant suffering. Consult Carandini, ‘Vita di M. Fanti’ (Verona 1872), and Di Giorgio, A., ‘Il Generale M. Fanti’ (Florence 1906).

FANTIN-LATOUR, foṅ'taṅ-lạ-toor, **Henri (Ignace Henri Jean Théodore)**, French painter: b. Grenoble, 14 Jan. 1836; d. 28 Aug. 1904. He received his early instruction from his father, a celebrated pastellist, and studied also under Lecoq de Boisbaudran and Couture. He first exhibited at the Salon in 1861, but his distaste for academic tradition caused him to be looked on with little favor and in 1863 he was represented in the Salon des Refusés, with Manet, Whistler and others. He lived in England for a time and many of his portraits are in that country. He excelled in portraiture and flower groups. His best known are ‘Hommage à Delacroix,’ a group including Legros, Whistler, Bandelaire, Champfleury and the artist himself; ‘Un Atelier à Batignolles,’ included portraits of Manet, Monet, Renoir and Zola. It is now in the Luxembourg Gallery. In ‘Un Coin de Table’ were presented Camille Peladan, Rimbaud, Verlaine and others. Many of his flower groups are in England. In his later years he gave considerable attention to lithography. In 1876 he exhibited ‘L'Anniversaire’ at the Salon in honor of Berlioz. He illustrated Jullien's ‘Wagner’ (1886) and ‘Berlioz’ (1888). His lithographs are mostly in the collections of the British Museum, the Louvre and at Dresden. Consult Jullien, ‘Fantin-Latour, sa vie et ses amitiés’ (Paris 1909).

FANTOCCINI, fän-tŏ-chē'nē, an exhibition of puppets, or a dramatic representation on a small scale, performed by figures or dolls, an amusement of which the Italians are extremely fond, and which is frequently performed in a portable theatre — like that of Punch and Judy.

FANUM FORTUNÆ. See FANO.

FAR EASTERN QUESTION. The complex problems involved in the rise of Japan and the awakening of China and their relations to the great European and American powers are known in international politics as the Far Eastern Question. The term came into general use in the second half of the 19th century, when both China and Japan were drawn into nearer contact with Western nations. For a long time these countries segregated themselves from the West and pursued a policy of seclusion. The Chinese regarded the outside nations as “barbarians” and the foreign rulers as inferior to the *Teen-tsze* or the Son of Heaven, as they called their emperor. In Chinese official documents, for instance, the king of England is described as having been “reverentially submissive,” and he is said to have “repeatedly presented tribute.” On the occasion of Lord Amherst's embassy to Peking in 1816 it was demanded of him that he should perform the ceremony of thrice kneeling and nine times bowing the head to the ground before the Chinese emperor. In 1887 the American chargé d'affaires wrote to the high commissioner at Canton that the fountain of all difficulties between China and foreign nations is the unwillingness of the former to acknowledge England, France, America and other great powers of the West as her equals. The Chinese officials, in addressing their own sovereign, spoke of the foreign diplomatic representatives as if they were not only the subjects of the emperor of China, but as the subordinates of the Chinese mandarins. The treatment to which the foreigners were subjected corresponded to this haughty language.

However, within recent years China has given signs of a reawakening, and not only China but all Oriental peoples of farther Asia are generally showing impatience of Occidental dominion. As early as 1842 and 1843 the British had signed a commercial treaty with the Chinese in regard to Hongkong. But the Celestial Empire remained practically closed to the foreigners until the treaties of Tientsin and Aigun (1858) opened to the Chinese a new view of their relations and duties toward Great Britain, France, Russia and the United States of America. These treaties provided the admission of foreign ambassadors to the imperial court at Peking, the toleration of Christianity, the postal service, the legalization of opium and the right of trading in the interior of the country. The rise of modern Japan began even before that of China. In 1853 an American, Commodore Perry, with a fleet of four ships of war arrived in Japanese waters to effect some arrangement for the protection of American seamen and to obtain permission for American vessels to enter the Japanese ports. His request was eagerly debated among the Japanese parties. Some were opposed to admitting foreigners into Japan, because by giving the Japanese educational advantages, machinery and other curiosities they «will deceive the ignorant people.» The others said that Japan was not in a position to take up arms against the foreign world; that her true policy was to accept treaties with Western peoples, and so to strengthen herself by learning the arts and sciences of the West. These arguments commended themselves to a majority of the Shogun Council. In consequence a treaty was concluded (1854) between the Shogun and Commodore Perry, by which the ports of Shimoda and Hakodate were promised to be opened for the reception of American ships. There was also stipulations with respect to the facilities of trading and an article permitting the appointment by the United States of consuls or agents to reside in Shimoda. Similar treaties of amity and commerce with England, France, Holland, Prussia, Portugal and Russia were concluded later. In 1869 the Mikado took the famous Charter Oath, promising to create a deliberative assembly. By the edicts of 1871, 1872 and 1875 he finally abolished the feudal system. Occidental civilization and European models of war training were rapidly adopted. Japan became a formidable military and maritime state. The war with China over Korea (1894–95) and with Russia over Manchuria and Korea (1904–05) demonstrated Japan's prowess. It was only the combined opposition of France, Germany and Russia that prevented her encroachment on Chinese territory.

In the meantime China was lulled by her reactionaries into a false security which proved disastrous when the days of trial came. In 1895, by the treaty of Shimonoseki, the independence of Korea was recognized (its annexation to Japan occurred in 1910), and China promised to cede to Japan the Liaotung Peninsula with Port Arthur, the Pescadores and Formosa, paying also an indemnity of 200,000,000 taels and granting to the Island Kingdom new and important commercial advantages. During the years from 1895 to 1897 Germany wrested from China the harbor of Kiao-chow and obtained a «sphere of influence» in the province of Shantung and the Yellow River Valley. But no sooner had German scored these successes than Great Britain presented a demand (1 July 1898) for the port of Weihaiwei, which was leased to her for 25 years. In the south the French took on lease the port of Kwangchow and the Bay of Pangchangwan. More interesting than the holding of harbors on lease, as indicating the relations of the powers to each other and their spheres of interest in China, were the many concessions of railroad, mining and other franchises made by China to England, Germany, Russia, France, Belgium and America. These foreign powers practically formed an «unholy alliance,» as the Japanese called it; and their purpose was to «reform» China and to introduce there Western ideas and progressive methods. Their policy was welcomed by the enlightened Chinese, the «literati,» and by the better-educated element among the people; but it awakened dismay and anger among the conservatives and the reactionary Manchus. On 12 Feb. 1912 the dynasty of Manchu was overthrown and the constitution of a republic formed on Western models was established.

Of all the great powers Russia had for a certain time the greatest opportunity toward developing its commercial and political activities in the Far East. The Russians had established themselves in large numbers in towns of Chinese Manchuria, in Kiakhta, Mukden, Kirin and Tsitsihar. The navigation of the Ussuri and Sungari rivers fell wholly into their hands, and colonization in Manchuria was fostered under various pretexts. After the Boxer rising (1900) and the Portsmouth Treaty (5 Sept. 1905) Russia proceeded to carry out her railway plans across Chinese territory, particularly through Outer Mongolia. Under the Urga Convention of 3 Nov. 1912 Russia obtained privileges and concessions to exploit the mining industries and construct the railroads in Outer Mongolia. But as soon as the terms of this convention were published the Republican Parliament in Peking clamored for war with Mongolia and with Russia. After protracted discussion a declaration was signed (3 Nov. 1913) between China and Russia by which Chinese suzerainty over Outer Mongolia was recognized.

Russia's aggressive foreign policy in the Far East under the Romanov's rule had caused Japan to take into consideration the situation in Inner Mongolia, which borders on her sphere of interest in Manchuria. But these claims were waived, and Japan contented herself in the treaty of 25 May 1915, with China's undertaking to open in the interest of trade and for the residence of foreigners certain suitable places in eastern Inner Mongolia. The whole treaty, which incorporated also an exchange of notes regarding the non-alienation by China of territory in Fukien province for military or naval purposes, was intended to obtain for Japan a *demarche* and further freedom for commercial and industrial expansion.

As concerns the policy of the United States in the Far East, it has obtained neither territorial interest nor great political influence there. America became more intensely concerned in Far Eastern politics after the acquisition of the Philippines in 1898. The American capitalists had secured rights to build a great trunk-line from Canton to Hankow. But this concession had been made over in 1904 to the Belgian syndicate on receiving compensation of $6,700,000, so that the whole road from Peking to Canton seemed likely to fall under Franco-Belgian control. The American government merely satisfied itself with securing commercial advantages. In 1900 Secretary John Hay, by a statesmanlike diplomatic manœuvre, obtained from France, Germany, Great Britain, Italy, Russia and Japan what appeared to be a guaranty of the «open door» policy in the Far East—that is, equal commercial treatment of all—within their respective spheres of influence. In 1908 friendly notes were exchanged between Japan and the United States. Free and peaceful development of Japanese and American commerce in the Pacific Ocean and equal opportunity for foreign commerce and industry in China were the principles affirmed by the Japanese Ambassador at Washington and Mr. Elihu Root. How different were the conditions under which these notes were penned from those existing in 1853 when Commodore Perry delivered his ultimatum to the Shogun!

When the Great War began the Far Eastern Question was still unsettled. It was in August 1914 that the German and Austro-Hungarian war lords let loose their enormous armed forces on Serbia, Belgium, France and Russia. Great Britain took the part of the outraged peoples and asked the Japanese government for assistance under the terms of the Anglo-Japanese Alliance of 1902 and 1911. On 23 Aug. 1914 the Mikado declared war on the Kaiser. Assisted by a small British force the Japanese uprooted the German settlement in the Shantung Peninsula, destroyed the great German naval base in the Pacific and prevented the Germans from organizing risings in China and Manchuria. On this occasion the Japanese lost a destroyer, a torpedo-boat and three mine-sweepers; also there were killed 416 and wounded 1,542; the British had 12 killed and 61 wounded. The German casualties are said to have been under 1,000.

In China, British and American influence has been predominant for a number of years. It was natural, therefore, that Chinese sympathies would be with the Entente Allies. Yet China did not come out at first emphatically for the war. She restrained herself to making common cause with the Allies, due to her strained relation with Japan, and on account of the fact that the latter had pressed certain demands which were detrimental to the integrity of the Chinese Republic. Events, however, rapidly forced China to abandon her attitude of quasi-neutrality. Shortly after America's severance of relations with Germany and Austria, China began to discuss similar action, and on 14 Aug. 1917 she formally declared war against Germany and Austria-Hungary. Meanwhile the political situation in Manchuria became acute. Owing to the outbreak of the Russian Revolution (15 March 1917), an international crisis had been engendered in this region, which threatened the tranquillity of the entire Far East. There was some fighting in this province between the Russian Bolsheviks and other fellow-citizens who disagreed with them. It became necessary to restore order, and a rumor was circulated in Russia that Japanese troops had been sent to Harbin for that purpose. The report was false, but a Chinese division was sent to the spot to maintain order. At the beginning of 1918 similar troubles broke out at Vladivostok. This fortified naval station is in the Russian maritime province, and it has been largely used during the war for the transmission of arms and munitions from Japan and the United States of America to Russia. A good many Japanese have settled there in this and other occupations. The full details of the mutiny that broke out in the garrison are not known, but the Japanese government became apprehensive for the safety of its subjects and considerable amounts of property held there awaiting shipment, owing to the uncertain revolutionary conditions prevailing in Russia. A squadron was accordingly sent to Vladivostok to protect the persons and property of Japanese subjects. In order to show that the Entente Allies were agreed in this matter, the squadron was accompanied by a British warship. The Japanese government, acting with great circumspection, apprised the American and French governments of its purpose, and thus preserved the appearance of an Allied front. But further than a well-backed-up threat to establish order, Japan was not allowed to go, for the United States did not join Great Britain and France in advocating the insertion of armed force into Russia, at that time.

In May 1918, China and Japan concluded an agreement for a defensive alliance against Germany. Although the details of this agreement were not generally known, there is no doubt that the United States and other Allied governments were informed and probably consulted about the negotiations. The new treaty marked the beginning of a policy the purpose of which will be to check the free hand of Germany and its activities in the Far East.

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FAR FROM THE MADDING CROWD. Published in 1874, this novel has ever since been ranked among the greatest of Thomas Hardy's works. Although it possesses rather less tragic intensity than 'The Return of the Native,' it is on the whole a better-balanced book. And it is not without tragic power. The hopeless struggle of Fanny Robin against fate and malign chance, ending in that gasping, staggering journey to her death in the workhouse and the return of the thin coffin through the dripping gloom, is instinct with pity and terror. But this is not the main portion of the book; and although the love affairs of Bathsheba Everdene with her three suitors, Troy, Boldwood and Gabriel Oak, likewise have a due portion of the sombre and the tragic, and exhibit in their development more than traces of the typical Hardy philosophy of pessimism, nevertheless the book ends in the calm sunshine of well-earned happiness for the principals. The characters are all in humble circumstances,— shepherds and small farmers, chiefly. But their fortunes are so recounted as to give them all of the significance and epic largeness of "sad stories of the death of kings." Various factors contribute to this end; among them, the genius with which Hardy reveals the fundamental humanity of his characters, and the skill with which he places his human pygmies against a background of nature so potent and so infinite in aspect as to reduce to pettiness the difference between peasants and world-rulers. The author's minor rustics have often and deservedly been termed Shakespearean. Patient, shrewd, simple, rich in native humor, they are portrayed with unerring artistry. Add to these features structural perfection and varied and impressive stylistic achievement, and there results a novel superb in its compound of the comedy and tragedy of life, its elemental power; falling short of the highest mainly in its occasional pessimistic distortion of truth. Various works may be consulted for a general presentation of Hardy as novelist; but no criticism which is of outstanding importance is especially concerned with 'Far from the Madding Crowd.'

George B. Dutton.

FARABI, fą-rä'bē, **Abu Nasr Muhammad ibn Tarkhan al,** Arabian philosopher: b. Farab, Turkestan, 870; d. Damascus 950. He traveled to Bagdad and there studied Arabic, mathematics, medicine and philosophy. In philosophy he made an exhaustive study of Aristotle. He visited the court of the Hamdanid Saif Addaula, by whom he was cordially received and granted a pension. He lived quietly at court and died at Damascus. His works were long neglected, perhaps because Avicenna was more the fashion. In 1484, at Venice appeared his compendium of the 'Rhetoric' of Aristotle. Two works are contained in 'Alpharabii opera omnia' (Paris 1638) and a translation of two others is found in Schmölder, F. A., 'Documenta philosophiæ Arabum' (Bonn 1836). Consult Dieterici, Fr., 'Alfarabi's philosophische Abhandlungen' (Leyden 1890); 'Alfarabi's Abhandlung edes Musterstaats' (1895); 'Die Staatsleitung von Alfarabi' (1904); Brockelmann, C., 'Geschichte der arabischen Litteratur' (Vol. I, Weimer 1898); Nicholson, 'A Literary History of the Arabs' (Cambridge 1907).

FARAD (from Michael Faraday), the standard electrical unit, which is measured by the capacity of a condenser that with an electromotive force of one volt is able to overcome a resistance equivalent to one ohm in one second, or in other words the resistance offered by a cylindrical copper wire, 250 feet long, 1/20 inch in diameter, the ohm being the magneto-electric unit. See also Faraday.

FARADAY, Michael, English scientist: b. Newington Butts, England, 22 Sept. 1791; d. Hampton Court, 25 Aug. 1867. He received little or no education and was apprenticed to the trade of a bookbinder. During his term of apprenticeship, a few scientific works fell into his hands, which he read with avidity, and forthwith devoted himself to the study of, and experiments in, electricity. Having attended the lectures given in 1812 by Sir Humphrey Davy and taken notes thereon, he sent them to that philosopher and besought some scientific occupation. The reply was prompt and favorable. In 1813 Faraday was appointed chemical assistant, under Sir Humphrey, at the Royal Institution. Faraday discovered in 1820 the chlorides of carbon, and in the following year the mutual rotation of a magnetic pole and an electric current. These were strong encouragements to proceed on the path of discovery, and led to the condensation of gases in 1823. In 1829 he labored hard and, as he thought at the time, fruitlessly, on the production of optical glass; but though unsuccessful in his immediate object, his experiments resulted in the production of the heavy glass which afterward proved of great assistance to him in his magnetical investigations. In 1831 the series of 'Experimental Researches in Electricity,' published in the 'Philosophical Transactions,' began with the development of the induction of electric currents and the evolution of electricity from magnetism. Three years later Faraday established the principle of definite electrolytic action and in 1846 received at the same time the Royal and the Rumford medals for his discoveries of diamagnetism and of the influence of magnetism upon light respectively. In 1847 he discovered the magnetic character of oxygen, and also the magnetic relations of flame and gases. His papers, including other contributions to the store of modern science, are too numerous to mention in detail. It should be observed that the 'Researches,' though termed 'Experimental,' contain many hypothetical ideas and many inquiries into theories generally adopted up to their time. Among these may be specified the considerations respecting static induction, atmospheric electricity, and those relating to lines of force, both physical and representative, on which having sufficiently stated his views, he was content to leave them for solution to time and future experiment. It may be added

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that his last hypothetical view related to the conservation of force, and that one of his latest papers treats of the division of gold and other metals. In 1833 Faraday was appointed professor of chemistry in the Royal Institution, London, which chair he continued to hold until his death. In 1835 he received from government a pension of $1,500 per annum in recognition of his eminent service to science. From 1829 to 1842 he was chemical lecturer at the Royal Academy. He was a knight of several of the European orders, and a member of the chief learned and scientific societies in Europe and the United States. Consult Tyndall, 'Faraday as a Discoverer' (1868); Jones, Bence, 'Life and Letters' (1870); Gladstone, J. H., 'Life of Michael Faraday' (1872); Thompson, 'Michael Faraday: his Life and Work' (1898).

FARADAY. This is the technical name given to the unit quantity of electricity discovered by Michael Faraday to be necessary for the disposition of the chemically equivalent weight of any element or radical. Since the chemically equivalent amount of materials produced by complicated reactions is sometimes rather difficult to determine by one not skilled in analyzing such reactions, it sometimes simplifies the matter to consider the Faraday from a somewhat different standpoint and define it as the unit quantity of electricity which is necessary to make a unit change of valence in a gram-atom of any element. This unit is concerned only with the quantity of electricity passing and does not in any way involve the energy absorbed in the reactions. (See ELECTROCHEMISTRY and ELECTROLYSIS). The value of this unit was for many years accepted as 96,540 coulombs. The fundamental constants on which this unit depends are by general acceptance the atomic weight of silver and the amount of silver deposited per coulomb. Since values for both of these have been accepted by international agreement, the atomic weight at 107.88 and the grams per coulomb at 0.00111800, the value of the Faraday is thus specified as $\frac{107.88}{0.001118} = 96{,}493.7$; for ordinary calculations this can be rounded off to 96,500 without introducing any appreciable error.

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FARADAY EFFECT. See LIGHT.

FARADAY TUBES. See ELECTRICITY.

FARADAY'S LAWS. The two laws of electrochemical change laid down by Faraday about 1835, and known by his name, are two of the most fundamental statements in natural science. Faraday's first law specifies that the amount of chemical action produced by an electric current in an electrolysis is directly proportional to the quantity of electricity which passes through the circuit. The second law specifies that the quantities of different substances that are produced by the same amount of electricity at the electrodes during the electrolysis of different solutions are directly proportional to the chemically equivalent weights of the substances concerned. The quantities of material produced by an electrolysis are then affected by only three factors, the magnitude of the current, the time that it acts and the chemically equivalent weight of the substances being produced at the electrodes, and are entirely independent of such factors as concentration or temperature of the solution, the size or distance apart of the electrodes and all other purely physical conditions. These laws hold with great exactness, not only for ordinary aqueous solutions, but also for non-aqueous solutions and for fused salts, or, in other words, for *all* electrolytes. This, however, does not mean that in every electrolysis there is always obtained the yield of any particular product that is called for by Faraday's laws, for this is not always the case. The amount of material actually produced from any given electrolysis is called the "current yield," and the ratio of the current yield to the theoretical amount called for by Faraday's laws is the "current efficiency." When the current efficiency is less than 100 per cent, this is due not to the fact that Faraday's laws do not hold in this particular case, but to the fact that the physical conditions imposed on the electrolysis have caused supplementary reactions to take place simultaneously with the first, thus changing the results. These supplementary reactions may be electrochemical in character, or they may be purely chemical. For example, in the electrolysis of a solution of copper sulphate, if the current density is too high, the amount of current passing in any given instant will call for the deposition of a greater amount of copper than happens to be present in the electrolyte in contact with the electrode. Since the current cannot pass without doing some work, that portion of the current which cannot be satisfied by the deposition of copper will cause decomposition of the water of the solution and will deposit hydrogen on the cathode simultaneously with the copper. Since the electrolysis is primarily designed for the deposition of the copper, the current efficiency for copper is then less than 100 per cent, but the current efficiency for both reactions taken together will be 100 per cent. On the other hand, if the deposition were being made in a strongly acid solution, the acid present would cause a certain amount of chemical solution of copper while the deposition is going on. In that case, the current would be doing the required work, but the product would be lost in its original form and the current efficiency would again be less than 100 per cent. Hence the physical conditions imposed on an electrolysis cannot change in any way the amount of decomposition effected by the current, but can only change the nature of the product obtained. The quantity of electricity that is necessary to deposit the chemically equivalent weight of any substance is 96,500 coulombs (ampere-seconds) and this unit is known as a Faraday after its discoverer. Another way of stating this is to say that one Faraday of electricity, 96,500 coulombs, is required to make a unit change in valence in a gram-atom of any element or radical. The fact that 96,500 coulombs will deposit one chemically equivalent weight of any substance makes it possible to calculate from this relation the amount of any element that would be deposited by any given amount of current. This is known as the electrochemical equivalent (q.v.). See also ELECTROCHEMISTRY; ELECTROLYSIS.

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FARADISM. See Electrotherapeutics.

FARAFEH. See Farafra.

FARAFRA, fạ-rä'frạ, or **FARAFEH,** an oasis of the Libyan Desert, in Africa, containing several ruins of Greek and Roman origin. A coarse woolen cloth and earthenware are the manufactures.

FARALLONES (fär'ạ-lōns) **ISLANDS,** in the Pacific, off the coast of California, about 28 miles from the entrance to the Golden Gate; a group of six small rocky islands. A large number of rabbits are found on the islands; they are prolific in bird life; and many sea-lions are on the coast. The islands were created a Federal bird reserve in 1909. A lighthouse, with all modern equipment, on the southern island, is 360 feet above the water and is visible for 26 miles.

FARANDOLA, fa-ran'dō la, or **FARANDOLE,** fa-ran'dōl, a dance with various figures, popular among the peasants of the south of France and the neighboring part of Italy. It is in triple time and performed by men and women taking hands and forming a long line and winding in and out with a waving motion. The figures of the farandola, by the name of the Spanish dance, were once well known in English ballrooms.

FARCE (Ital. *farsa,* from Lat. *farcire,* «to stuff»), a dramatic piece of a broad comic character. The difference between it and comedy proper is one of degree and not of kind. The aim of both is to excite mirth; but, while the latter does so by a comparatively faithful adherence to nature and truth, the former assumes a much greater license and does not scruple to make use of any extravagance or improbability that may serve its purpose. It does not, therefore, exhibit, in general, a refined wit or humor, but consists of ludicrous rencontres, exaggeration of personal peculiarities and dialogues provocative of fun. The beginnings of Greek and Roman comedy consist of rustic farces or pantomimes (see Atellanæ Fabulæ); the first farces, in the modern sense, were composed by the fraternity of the Bazoche (q.v.) in Paris, as a contrast to the ecclesiastical plays performed by the religious orders. The most widely celebrated and most important of early farces is that of the advocate ‹Maistre Pierre Patelin,› which was acted in the 15th century and quickly spread itself over Italy and Germany. It is full of genuine comic quality and its dialogue has brightness and reality. The *commedia dell 'arte* of Italy were of a farcical nature. Molière elevated and refined the farce into his wonderful series of comedies of character. In England the origin of the modern farce dates back from the commencement of the 18th century. Few farces have kept a place in literature. (See Comedy; Drama; Literary Forms). Consult Chevaldin, L. E., ‹La Farce de Patelin et ses Imitations› (Paris 1889), from the work by Dr. K. Schaumburg; Petit de Julleville, ‹La comédie et les mœurs en France au moyen âge› (Paris 1886); ‹Repertoire du Théâtre comique en France au moyen âge› (ib. 1886); Inchbald, ‹A Collection of Farces and Other Afterpieces› (London 1815).

FARCY, in horses depends upon the same causes as glanders (q.v.)— in fact, is an outward manifestation of glanders. The absorbent vessels of the superficial parts of the body, but usually those of one or both hind limbs, are inflamed, tender, swollen, hard and knotted. The vitiated lymph thus poured out softens, and ulcers of farcy buds appear. Unlike the ulcers of glanders, they are sometimes thought to be curable, but an animal apparently cured is not safe to be with other horses, as the *contagium* — the *Bacillus mallei* — almost invariably remains, and the animal is thus a centre of infection and a source of danger.

FARDEL-BOUND, a term applied to sheep and cattle when suffering from a disease caused by the retention of food in the third stomach, or maniplies. The disease frequently arises from the eating of over-ripe clover, vetches or rye grass. The food being tough and indigestible finally causes chronic inflammation.

FAREHAM, fār'ạm, England, a market town in Hampshire, at the northwest extremity of Portsmouth Harbor. It has earthenware and brick-making manufactures. Pop. 9,674.

FAREL, Guillaume, gē̦-yōm fä-rel, Swiss reformer: b. near Gap, Dauphiny, 1489; d. Switzerland, 13 Sept. 1565. At an early period the study of the Bible led him to reject many of the chief doctrines of the Roman Catholic Church. At Basel, in 1524, he publicly sustained several theses in support of Protestantism, and he afterward preached in Strassburg, Montbéliard and elsewhere. In 1530 he secured the public adoption of the Reformed doctines in Neufchâtel. Geneva, however, became the principal scene of his labors, and through his influence Calvin became leader of the Genevan Reformers. Here, in the religious conferences of 1534 and 1535, he defended his beliefs so successfully that the Reformed parishes not only obtained permission to hold public religious services, but the council formally embraced the Reformation. In concert with Calvin he took an active part in 1536 at the disputation in Lausanne, when the Reformation was embraced. In consequence of a quarrel, arising out of an attempt to enforce a stricter moral discipline, he was banished from Geneva in 1538, and ultimately took up his residence in Neufchâtel. His marriage when he was on the border of 70 with a young wife caused a coolness with Calvin. He was a man of intense fervor and proselytising zeal, but holds no place as a theologian. Consult ‹Life,› by Bevan (1893).

FARENHOLT, fär'ĕn-hōlt, **Oscar Walter,** American naval officer: b. near San Antonio, Tex., 2 May 1845. He was educated in the schools of San Antonio, New Orleans, La., and Pittsburgh, Pa. He entered the navy at New York as seaman, 18 April 1861, serving on the frigate *Wabash,* and participating in engagements and battles at Fort Hatteras, N. C., Port Royal, S. C., Fort Pulaski, Ga., etc. He was severely wounded at the battle of Pocotaligo, S. C., on 22 Oct. 1862, was sent to the Naval Hospital at New York and discharged from the navy. He recovered from his wounds, re-entered the navy in February 1863 on the monitor *Catskill* and was in almost daily engagements with the defenses of Charleston, S. C., from April 1863 to April 1864. He participated in the unsuccessful storming party of Fort Sumter in September 1863, was made acting ensign in August 1864, and commanded the schooner *Henry James* attached to squadron in sounds of North Carolina, took part in the recapture of Plymouth and several engagements on Roanoke, Chowan and Black Water rivers, and the capture of Fort Fisher. He was commissioned ensign 12 March 1868, lieutenant in 1870, commander in 1892 and captain in 1900, reaching the rank of rear-admiral 1 Sept. 1901, when he voluntarily retired from active service. During the Spanish-American War he was stationed at Shanghai as Admiral Dewey's base of supplies and information. He is the only officer of the navy who beginning as seaman gained the rank of rear-admiral.

FARFA ABBEY, Italian Benedictine monastery situated 25 miles from Rome. Saint Laurence is said to have founded it in the 6th century; it was subsequently enriched by endowments from the Lombard and Carlovingian kings. Near the close of the 9th century the Saracens obliged the monks to evacuate the monastery and it was deserted for about 50 years. It was revived, however, at the close of the 10th century and the Cluniac reforms were introduced. The wealth of the monastery now grew apace until it became the wealthiest establishment of its kind in Italy, owning nearly 700 churches and convents, two towns and about 130 castles and several villages. In 1842 the monastery was annexed to the bishopric of Sabina by Gregory XVI. An important historical work 'Chronicon Farfense' was compiled at the monastery by Gregory of Catina in 1105–19. Balzani published an edition of the work (Rome 1903). Consult Albers, (ed.) 'Consuetudines Farfenses' (Stuttgart 1900).

FARGO, William George, American capitalist: b. Pompey, N. Y., 20 May 1818; d. Buffalo, N. Y., 3 Aug. 1881. He became Buffalo agent of the Pomeroy Express Company in 1843; established the first express company west of Buffalo, in 1844; and in 1868 became president of the great corporation controlling the whole West, the Wells-Fargo Express Company, and now consolidated in the American Express Company. Though a Democrat in politics, he paid the wages of every man in his employment who enlisted in the Union Army during the Civil War.

FARGO, N. D., city, county-seat of Cass County, at the head of navigation on the Red River, on the Chicago, Milwaukee and Saint Paul, the Northern Pacific and the Great Northern railroads. It contains a United States land office, Fargo College (Congregational), the State Agricultural and Mechanical College, Oak Grove Seminary (Lutheran), Sacred Heart Academy (Catholic), the Western School of Expression, Saint Luke's Hospital, Saint John's Hospital, high school, courthouse, waterworks, street railroad and electric-light plants, several banks and a number of daily and weekly newspapers. It has large brick yards, a packing plant, creameries, bottling works and manufactories of flour, harness, candy, corsets, mattresses, bed springs, artificial limbs, trunks, crackers, etc. The United States census of manufactures for 1914 showed within the city limits 76 industrial establishments of factory grade, employing 933 persons; 689 being wage earners receiving annually a total of $447,000 in wages. The capital invested aggregated $2,970,000, and the year's output was valued at $3,006,000; of this, $1,265,000 was the value added by manufacture. It is an important grain market and one of the largest distribution centres for heavy farm machinery in the country. It has also extensive jobbing interests in groceries, fruits and notions; and an automobile industry doing business annually of $15,000,000. Pop. (est.) 22,000.

FARGO COLLEGE, a coeducational institution in Fargo, N. D.; founded in 1888 under the auspices of the Congregational Church. In 1916 there were in attendance 505 students. There were 30 instructors and a library of 8,000 volumes.

FARGUS, Frederick John (HUGH CONWAY), English novelist: b. Bristol, England, 26 Dec. 1847; d. Monte Carlo, 15 May 1885. He adopted his pseudonym from the school frigate *Conway*, stationed on the Mersey, which he entered when he was 13, for the purpose of training for a seafaring life. He subsequently entered the auctioneer business, employing his leisure in writing clever newspaper verse and occasional tales. Some songs of his were accepted and published in 1878, and a volume of verse in 1879; but it was the issue and rapid sale of his melodramatic story 'Called Back' (1883), which made him famous. He then went to London, where he adopted the profession of authorship. His other writings include 'Dark Days' (1884); 'A Family Affair' (1886); 'Slings and Arrows'; 'A Cardinal Sin' (1883); 'Bound Together' (1884).

FARIA, fä-rē'ä, **Manoel Sevrim de,** Portuguese author: b. Lisbon, Portugal, 1583; d. Evora, 25 Sept. 1655. He devoted many years to the study of his country's literature, giving his researches and thought a lasting form in 'Various Essays' (1624), containing appreciations and biographies of Camoens and other great writers. He also wrote 'Jottings of Portugal' (1655).

FARIA Y SOUSA, fä-rē'ä ē sō'zä, **Manoel,** Portuguese historian and lyric poet: b. near Pombeiro, in Portugal, 18 March 1590; d. Madrid, Spain, 3 June 1649. A passion for a beautiful girl first awakened his poetical genius. He celebrated her under the name of Albania in his sonnets, married her in 1613 and went to Madrid. But he did not succeed there, and returned to Portugal. He also visited Rome, and gained the notice of Urban VIII. Among his writings are 'Discursos Morales y Politicos'; 'Epitome de las historias Portuguezas'; and a collection of poems called 'Fountain of Aganippe' (1644–46). His style was pure and strong and his descriptions full of vigor.

FARIBAULT, fą'rē-bō, **Eugene Rodolphe,** Canadian geologist: b. L'Assomption, P. Q., 1860. He received his education at the Ecole Polytechnique and at Laval University, Quebec. He joined the Canadian Geological Survey in 1881, and from 1884 to 1909 was in charge of a survey of the gold fields of Nova Scotia. At the Paris Exposition of 1900 he had charge of the Canadian mineral exhibit and also served as juror there. For his model of the Goldenville gold mine he was awarded a medal and was the recipient of similar honors in 1904 at the Louisiana Purchase Exposition, Saint Louis.

FARIBAULT, făr-ĭ-bō', Minn., city and country-seat of Rice County at the confluence of the Cannon and Straight rivers on the Pennsylvania and the Chicago, Milwaukee and Saint Paul railroads, 53 miles south of Saint Paul. It has a fine location in a region which abounds in beautiful lakes. It has manufactories of pianos, carriages, furniture, boiler works, shoes, gasoline engines, butter-tubs, foundry products and rattan goods, and canning establishments, breweries, flour-, planing- and woolen-mills. Faribault is noted for its fine schools, both public and private. The State schools for the deaf, dumb, blind and feeble-minded are located here. The Seabury Divinity School, the Shattuck Military School for boys and the Saint Mary's School for girls are flourishing institutions, all three of which are under the auspices of the Protestant Episcopal Church; Bethlehem Academy is in charge of the Sisters of Saint Dominic. Faribault was the home of Bishop Whipple (q.v.). Faribault became noted in 1891, because of a controversy which arose regarding the incorporation of parish schools into the public school system. It was called by many then a new movement; but it was similar to the plans which had long been in existence in several cities and towns in other parts of the United States; as Poughkeepsie, Corning, Ogdensburg and Plattsburg in the State of New York; and several places in Connecticut, Ohio and in other States. Faribault was settled about 1853 and incorporated about 1872. It adopted the commission form of government in 1911. The city owns and operates its waterworks. Pop. 10,000. See Parish Schools.

FARÏD UD-DIN ATTAR, fạ-rēd'ŭd dēn ạt'tār. Persian poet and philosopher: b: Nishapur, between 1119 and 1150 A.D.; d. about 1229. His real name was Abu Talïb Mahommed ben Ibrahïm, and Farid ud-Din was an honorable designation given him late in life and signifying Pearl of the Faith. He followed for many years the profession of druggist but abandoned it for a study of the contemplative life. He studied the mystic theosophy of the Sufis under Sheik Rukneddin. He visited Mecca, Damascus, Egypt and India, and at Bagdad was invested with the Sufi mantle. He lived the greater part of his life in Shadyakh. He was slain by a soldier of Ghenghis Khan. He wrote about 120,000 couplets; his greatest work is the 'Mantik uttair,' an allegorical poem containing a survey of the doctrine of the Sufis, and the desire of the human soul to be merged with the divinity. In 1857 the text of the 'Mantik' was issued by Garcin de Tassy, and in 1863 a complete translation was issued in Paris. Other works by this author are 'Pandnama' (French trans., by Silvestre de Sacy, Paris 1819); 'Bulbul Nama'; 'Wasalet Nama'; Khusru va Gul'; Tadhkiratu 'l Awliya.' Consult Palmer, E. H., 'Oriental Mysticism' (1867), and Browne, E. G., 'Literary History of Persia' (1906).

FARIDKOT, fûr'ēd-kōt', India, a native state in the Punjab, with an area of 642 square miles and a population of 125,000. It lies north of the Nabha state and ajoins the British district of Ferozepore. The gross revenue is about $140,000 and there is no tribute. Two railways cross the country, the Rewari–Ferozepore and the Fazilka systems. The capital, Faridkot, is 84 miles distant by rail from Lahore. A branch of the Sirhind canal is used extensively for irrigation.

FARINA, Giuseppe La. See La Farina.

FARINA, fä-rē'nä, **Salvatore,** Italian novelist: b. Sorso, Sardinia, 10 Jan. 1846. He studied law at Turin and Pavia, but after graduation devoted himself to a literary career and made his home permanently at Milan. For many years he was in charge of the literary department of the *Gazzetta Musicale*. His tales were successful from the first, which was 'Two Amours' (1869). Among the others are 'A Secret' (1870); 'Forbidden Fruit'; 'Romance of a Widower'; 'Dounina's Treasure'; 'Courage and Onward'; 'Little Don Quixote' (1890); 'Living for Love' (1890); 'For Life and for Death' (1891); and 'Il signor Io,' his masterpiece. The sympathy with lowly life and the rich humor of his stories have gained for him the title of «The Italian Dickens.» He is the best known abroad of all Italian novelists. His 'Autobiography' appeared in 1914. See Il Signor Io.

FARINA (Lat. «flour»), a term popularly applied to a good product made from white maize, having grains coarser than those of meal, but finer than hominy. A somewhat simple preparation is made from the inner portion of wheat grain. Generally, it is applied to the flour or meal of «any species of corn, nut or starchy root.» In early works on botany the pollen of flowers was styled farina.

FARINATO, fạ̈-rē-nä'tō, or **FARINATI,** fä-rē-nä'tē, **Paolo,** Italian painter: b. Verona 1522; d. there 1606. He took his style of painting from Veronese and Guilio Romano. His works are characterized by wealth of imagination, graceful but not always correct drawing, combined with harmonious coloring. He finds his modern counterpart in the English Rosetti. He painted both in oil and fresco. There are some fine frescoes of his in the choir of San Nazaro at Vërona; his wonderful 'Miracle of the Loaves and Fishes' (1603) is in the church of San Georgio Maggiore; his 'Finding of Christ in the Temple' is in the Berlin Museum, and 'Abraham and Hagar' in the New York Historical Society's collection.

FARINELLI, fä-rē-nel'lē (real name Carlo Broschi), Italian soprano singer: b. Naples, 24 Jan. 1705; d. Bologna, 15 July 1782. He studied under Porpora, and went from Rome to Vienna, where the Emperor Charles VI loaded him with rich presents. In 1734 Farinelli went to London, and by the magic of his singing so delighted the public that Handel was obliged to dismiss a rival company over whom he presided, in spite of all his powers and popularity. Many extraordinary stories are related of Farinelli's vocal skill and his command over the feelings and sympathies of his audience appears to have been unrivaled.

FARINGDON, făr'ing-dŏn, or **GREAT FARINGDON,** England, a market town in the county of Berks; 16 miles southwest of Oxford. Pop. 2,770.

FARINI, Luigi Carlo, loo-ē'jē kär'lō fä-rē'-nē, Italian historian: b. Russi, 22 Oct. 1812; d. 1 Aug. 1866. He studied medicine at Bologna, but early entered upon a political career, and

HIS EMINENCE JOHN M. FARLEY

Late Cardinal Archbishop of New York

was expelled from the Papal States in 1843, becoming Minister of Public Instruction in 1851, of Commerce 1860, president of the council in 1861 during Cavour's administration and Premier 1862-63. His influence contributed much to the union of central Italy with the kingdom of Victor Emmanuel II. His 'History of the Roman State from 1815 to 1850' (1850) was translated into English; and his 'History of Italy,' a continuation of Botta's celebrated work, is a performance of standard merit.

FARJEON, fär'jun, **Benjamin Leopold,** English novelist of Jewish descent: b. London, 1838; d. Hampstead, 23 July 1903. He spent some years in Australia and New Zealand as journalist and novelist, and was the editor and coproprietor of the first daily newspaper published in the latter country. His first successful novel was 'Grif: a Story of Australian Life' (1870). It was followed later by 'London's Heart' (1873); 'Golden Grain' (1874); 'Blade o' Grass' (1874); 'Bread and Cheese and Kisses' (1874); 'Love's Victory' (1875); 'Duchess of Rosemary Lane' (1876); 'At the Sign of the Silver Flagon' (1876); 'Solomon Isaacs: a Christmas Story' (1877); 'Aaron the Jew'; 'Great Porter Square' (1884); 'The House of White Shadows' (1884); 'The Tragedy at Featherstone' (1886); 'The Secret Inheritance' (1887); 'Devlin the Barber' (1888); 'Toilers of Babylon' (1888); 'The Betrayal of John Fordham' (1897); 'Samuel Boyd of Catchpole Square' (1899); 'Pride of Race' (1900); 'The Mystery of the Royal Mail' (1902), etc. He gave readings in the United States in the fall of 1877. Farjeon has been compared with Dickens in his "sentiment and minute characterization." The comparison is not altogether a happy one, and the knowledge that it had been made affected the novelist's style somewhat, and not for the better.

FARLEY, Harriet. See DONLEVY, H. F.

FARLEY, James Lewis, Irish journalist: b. Dublin, Ireland, 9 Sept. 1823; d. London, England, 12 Nov. 1885. Established in Turkey as a bank official, he became correspondent of two or three great London dailies and speedily made himself an authority on Turkish and Near Eastern questions. His books include 'The Druses and the Maronites' (1861); 'Turkey: Its Rise, Progress and Present Condition' (1866); and 'Modern Turkey' (1872).

FARLEY, John Murphy, American Roman Catholic prelate: b. Newton-Hamilton, County of Armagh, Ireland, 20 April 1842; d. Mamaroneck, N. Y., 17 Sept. 1918. He began his classical studies in Saint MacCarten's College, Ireland, and completed his course in Saint John's College, Fordham. He continued his studies for the priesthood in Saint Joseph's Seminary, Troy, N. Y., and in the North American College, Rome. He was ordained in Rome, 11 June 1870, and the same year returned to the United States to begin work in Saint Peter's parish, New Brighton, Staten Island. In 1872 Archbishop McCloskey of New York chose him for private secretary. In 1884 Pope Leo XIII made him private chamberlain with the title monsignor, and Cardinal McCloskey appointed him permanent rector of the church of Saint Gabriel, New York, where he remained until he was made archbishop. In 1891 he was made vicar-general of the archdiocese of New York. In 1892 he was made domestic prelate to Leo XIII, and in 1895 prothonotary apostolic, all of which positions gave him special privileges. In December 1895 he was consecrated titular bishop of Zeugma, and became assistant to the archbishop of New York. When the see of New York became vacant by the death of Archbishop Corrigan (1902), the lists of names sent to Rome by the suffragan bishops and permanent rectors each had at the head the name of Bishop Farley as first choice for archbishop. He received his appointment from Leo XIII, but the pallium was conferred under Pius X, on 15 Sept. 1902. He was the fourth archbishop of New York and governed one of the largest Roman Catholic dioceses in the world. He was the metropolitan of the ecclesiastical province of New York, which is composed of eight dioceses outside the archdiocese which includes also the Bahama Islands; six in the State of New York and two in New Jersey. The author of the 'Life of Cardinal McCloskey,' Archbishop Farley was also a contributor to various magazines, and took great interest in movements for the social welfare of the city. He was created cardinal by Pope Pius X, 27 Nov. 1911. At the time of his death (1918) the archdiocese of New York comprised a Catholic population estimated at 1,350,000; 1,117 priests; 388 churches; parochial schools attended by 91,140 children; 25 orphanages; 27 hospitals, and other institutions, benevolent and educational.

FARLOW, William Gilson, American botanist: b. Boston, Mass., 17 Dec. 1844. After graduating at Harvard, he spent several years in Europe pursuing his favorite study and became professor of cryptogamic botany at Harvard in 1879. In 1899 he was president of the American Society of Naturalists, in 1904 of the National Academy of Sciences, in 1905 of the American Association for the Advancement of Science, and in 1911 of the Botanical Society of America. His publications treat mainly of marine algæ, fungi and diseases of plants. Upon these subjects and particularly upon cryptogamic botany, he is considered an authority. He also published 'The Potato Rot' (1875); 'Diseases of Olive and Orange Trees' (1876); 'The Gymnosporangia or Cedar'; 'Apples of the United States' (1880); 'The Marine Algæ of New England' (1881); 'A Provisional Host-Index of the Fungi of the United States' (1888); 'Biographical Index of North American Fungi' (1905).

FARM, a tract of land devoted to agriculture, under the management of owner or tenant. The size of farms and their tenure differ very much in different countries. On the continent of Europe, where peasant proprietaries, cultivation by the metayer system (q.v.), and mixed tenures prevail, farms are generally small. In England, where the land is in the hands of a comparatively small number of proprietors and is let out to farmers who pay a fixed rent and make a trade of cultivating their holdings, these are in many localities large compared with continental farms. In the United States the majority of farms are owned by those who operate them. In 1900 between 54 and 55 per cent were so operated. In 1890 tenants operated 28.4 per cent of all the farms and in 1900, 35.3 per cent.

A comparatively small number are worked by part owners. The short tenure of land usually prevailing in England and Ireland has given rise to many disputes about compensation for improvements effected by tenants, etc. In Scotland it has been customary to give a lease for 19 years.

In these statistics the term "farm" includes, as defined by the twelfth census of the United States, "all the land, under one management, used for raising crops and pasturing live stock, with the wood lots, swamps, meadows, etc., connected therewith. It includes also the house in which the farmer resides, with all other buildings used by him in connection with his farming operations." As thus broadly defined the 6,361,502 farms in the United States in 1910 embraced, in addition to the general farm, the cotton, the sugar and the rice plantations of the country; large ranges in the Western States as well as smaller stock farms, the extensive farms devoted to the raising of grain; those producing chiefly hay and forage, tobacco, hemp, or hops, orchard fruits or small fruits; truck farms; dairy farms; poultry farms; bee farms; florists' establishments; nurseries, etc. In 1910 the farms of the United States comprised 878,798,325 acres, of which 478,451,750 acres were improved property. The number of farms in the States has increased so rapidly for several decades that in 1900 there were nearly four times as many as in 1850 and 25.7 per cent more than in 1890. Since 1880 the average size of farms has increased, being in 1900 146.6 acres. The number of farms under three acres was 41,882; and of farms of 1,000 acres and over 47,276. The medium-sized farms containing from 100 to 174 acres represented the highest value per acre. The total value of wealth produced on the farms of the United States was, in 1910, $10,501,686,375. This had increased, in 1916, to $13,448,310,509, of which 67.7 per cent came from crops and 32.3 per cent from animal and other products. There was, on American farms, in 1910, 61,803,866 head of cattle valued at $1,499,523,607, as against 63,617,000 head in 1917; horses 19,833,113 valued at $2,083,588,195 as against 21,126,000 head in 1917; mules 4,209,769, valued at at $399,338,308, against 2,915,000 head in 1917; sheep 52,447,861, valued at $332,841,585, against 48,483,000 head in 1917; swine 58,185,676, valued at $399,338,308, against 2,915,000 heads in 1917; goats 2,915, valued at $6,176,423. The total value of farm property in the United States was, in 1910, over $28,475,674,000. On the same date the farm buildings were valued at $6,325,451,528, and the implements and machinery at $1,265,149,783. The average value of the land per acre was $32.40; and with the buildings included $39.60. In 1910 32.5 per cent of the population of the United States were engaged in farming.

In 1917, 76 per cent of the United States farmers under 25 years of age were tenants. This percentage falls to less than 30 per cent for farmers 60 years of age, showing that the tendency of American farmers is for tenants to become proprietors. See Agriculture; Dairy Industry, American; Live Stock; Farm Machinery; Farm Power, Etc.

FARM CREDIT. See Farm and Farm Problems.

FARM CROPS. Definition.— Broadly speaking, the term farm crops may be applied collectively to any plant grown in appreciable quantity on farms. Commonly, and for practical purposes, however, it is understood to exclude the products of specialized lines of agriculture, such as fruits, vegetables and flowers (which come within the field of Horticulture), timber products (discussed under Forestry), etc. Farm crops are, therefore, specifically crops grown in fields (as distinguished from enclosed spaces, such as gardens and orchards) on a sufficiently large scale to render them essential features of the operation of the farm as a business enterprise.

Uses.— Every farm crop is grown for one or more of four main purposes. These are: (1) To be sold off the farm for cash or exchanged for some other valuable commodity; (2) to be consumed on the farm by the farmer and his household; (3) to be fed on the farm to livestock; (4) to be worked into the soil to improve its condition; that is, to supplement the manure supply.

While these ends are quite separate and distinct, any particular crop may serve different purposes under differing circumstances; or different parts of it may be utilized in different directions at the same time, or in the same season. For example, oats may be grown for its grain, or as a hay crop; cowpeas may be allowed to mature seed, they may be cut and cured as hay, or they may be planted solely as a "cover crop" to keep the ground clear of weeds until they are plowed under to supply "green manure." To a certain extent any harvested crop that leaves a stubble behind to rot and enrich the soil is in part a source of plant food; a green manure crop has, however, no other reason for existing.

In the case of corn, the grain may represent either a money crop, human food for home consumption or feed for domestic animals. In either case the cured stalks become "roughage" or "fodder" for cattle and horses. On the other hand, the whole plant may be harvested when partly mature and preserved as silage — a succulent, slightly fermented, shredded roughage — or again it may be cut while young, before ears or tassels have developed, and fed green to eke out a shortage of pasture grasses.

Still another example, involving a rather specialized farm activity as a side issue of the main enterprise is presented by the practice of farmers in favored localities who grow considerable acreages of grass and clover (generally regarded as hay and pasture plants only) solely for the production of seed, which sometimes proves one of the most profitable cash crops of the entire farm business.

The relations between the first two uses — namely, sale for cash and home consumption — have undergone considerable change during the last half century. Originally the farm was practically a self-contained, self-supporting unit. Everything grown on it was used there as food, clothing, shelter or fuel, and but few necessities were obtained elsewhere. Gradually, with the specialization of industry, the increase of manufactures, the improvement of transportation facilities and the increased dependence of different groups of the population, one upon another, the farmer came to buy more of his essentials from those who could make them faster, better and more cheaply than he; to sell more of his surplus products in order to get money wherewith to do this; and consequently, to raise larger acreages of a few crops that brought him the largest net profit and that were especially well adapted to his locality. Thus have grown up the special lines of farming such as wheat-raising, potato-growing, cotton-growing, etc., that have become associated with particular localities. It should be noted, however, that under certain conditions farmers may tend to revert toward the former system of raising more of their own foodstuffs, as for instance when high prices or transportation difficulties make them difficult to obtain. Such a tendency has been observed as the result of food shortages caused by the European War.

Classification.— Farm crops may be grouped in several ways other than according to strict botanical relationships. On the basis of utilization — the most important use of the crop being kept in mind — there are: (1) Food crops, such as potatoes, sugar beets, beans, wheat, rice; (2) feed crops, such as hay, corn, mangel wurzels and alfalfa; (3) fibre crops, including cotton, hemp and flax; (4) soil-building crops, which, as already explained, may include some qualified to fall in groups 1 and 2; (5) special-purpose crops, such as tobacco, castor beans, etc.

There may also be said to be two main classes of farm crops, the first including those that are grown in widely-spaced rows, between which the soil is regularly cultivated throughout most, if not all, of the growing season; and the second, including such crops as grains and grasses, which are sown in drills close together or even broadcast and allowed to grow without cultivation. This, however, may become a matter of preference or expediency on the part of the individual farmer, since, for example, cowpeas grown for hay are usually drilled or broadcasted, while if raised for seed they are planted in rows.

From a geographical standpoint the range of American farm crops is from tropical species suited only to southern latitudes and low altitudes, such as rice, sugar-cane and cotton, to hardy forms requiring cool, northern sections or the higher elevations of the central part of the country for their best development. Of these, flax, spring wheat and the Grimm variety of alfalfa are illustrations. In this connection the work of plant breeders in developing new strains and varieties of unusual hardiness and wide adaptability is constantly modifying the early notions of crop limitations.

Perhaps the most useful and definite classification of farm crops, however, is one based upon somewhat loose botanical relationships combined with practical cultural considerations. Here again the secondary use of any crop may place it in a different group from that to which its primary purpose assigns it. The latter is made the basis for the following lists of American farm crops arranged approximately in order of their importance. Each of the groups includes both annual and perennial plants, which characteristic occasionally plays an important part in determining the value of a particular crop in relation to the established rotation of farm-cropping system.

A. CEREALS

Corn (including the grain sorghums).
Wheat (including emmer and spelt).
Oats.
Barley.
Rye.
Buckwheat.
Rice.

B. NON-LEGUMINOUS FORAGE CROPS

Grasses for hay and pasture.
Sorghum.
Rape.
Millet.
Sudan grass.
Teosinte, etc.

C. LEGUMES

Alfalfa.
Peanuts.*
Clovers.
Peas (field).*
Cowpeas.*
Soy beans.*
Beans (field).‡
Velvet beans.
Vetch.
Lespedeza.
Kudzu.
And a few minor sorts.

D. MISCELLANEOUS FIELD CROPS

Cotton.
Potatoes.
Flaxseed.†
Tobacco.
Sweet potatoes.
Sugar cane.
Sugar beets.
Cabbage.
Hops.
Hemp.
Roots for stock feeding.
Any vegetable crop grown too extensively to be considered a garden or truck crop.

How Grown.— The cultural details for each of these crops are given elsewhere under their respective title. But there are certain relationships which are best considered at this point of a general discussion. Good farming practice requires for various reasons a rotation of farm crops and the most satisfactory rotations include at least one season of each of three types of crop, viz., (a) a tilled or cultivated crop; (b) a grain crop; and (c) a leguminous crop or at least a grass crop to be plowed under as sod after it has been mowed or pastured. As illustrations of these types there may be mentioned (a) corn, potatoes, cabbage or roots of any kind; (b) any of the cereals except corn, and rice which is limited to too small a territory; (c) any of the forage crop legumes, unless the crop is to be left down for less than two or three years, in which case alfalfa is rarely chosen.

The usual sequence in such a rotation involves growing one, two or even more crops of corn or potatoes, depending on the fertility of the soil, market demands, etc., then sowing a hardy winter grain such as wheat or rye late in the season after the crop is harvested. In some cases a spring grain crop is substituted. In either case a grass and clover mixture is sown with the grain in order to provide hay for a year or two after the grain is harvested and then, if desired, a year or more of pasture before it is plowed under in readiness for a new planting of corn.

Another type of rotation by which a soil can rapidly be built up consists of alternate crops of corn or cotton and cowpeas, soy beans, or some such legume, the latter sown between the rows of the tilled crop at the last cultivation. These and similar combinations are characteristic of the most modern agricultural methods by means of which progressive farmers are striving to build up the soils that have been depleted by long years of single cropping, erosion, careless management and general ignorance.

At the same time some crops, such as tobacco, hops and flax, are so especially adapted to certain soils and localities that even successful growers may not attempt to rotate frequently unless forced to by the invasion of plant diseases or insect pests preferring to depend on the use of fertilizers to maintain the productivity of the land.

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* Raised for seed as well as forage.
† Raised only as seed crop in United States.
‡ Raised for dried seed crops only.

In many cases there is a distinct connection between the size or type of farm and the kinds of farm crop it supports. In view of the development of agricultural machinery, which, however, remains comparatively expensive, the cereals (except corn) are grown as money crops mainly on large farms where enough can be planted to warrant an investment in seeders, harvesters, binders, etc. On the other hand, any farm that supports livestock, especially if it includes dairy cows, is very likely to include some corn, even though it may not be enough to justify the purchase of horse or power machinery and, therefore, entails more hand labor in planting and harvesting.

Similarly, a majority of farms in the United States report potatoes, although many of them probably grow the crop only for home consumption and not on the same scale or in accordance with the improved, economical methods found in such sections as Aroostook County, Me., the Greeley District of Colorado, etc.

A distinct tendency on the part of livestock farmers — and one that is approved and urged by investigators, educators and other authorities — is that of raising all the feed they can at home. Both because it is more difficult and bulky to transport, and because it is becoming a relatively more important factor in feeding operations, roughage (including silage corn, leguminous hays and green forage crops) is given the most acreage in such cases, the farmer preferring and finding it most profitable to buy the grains or mixed feed needed to supplement his home-grown forage. However, grain farmers are learning that an exclusive grain-growing program is a hard one on any soil, and are, in consequence, tending to include some livestock in their operations. Such a transition naturally involves the growing of pasture hay and perhaps green forage or "soiling" crops, which ultimately gives rise to a much more beneficial rotation system.

Factors in the Selection of Farm Crops. — The choice of one or more farm crops as features of a farming enterprise depends in part upon the personal preference of the farmer, but to an even greater extent upon conditions peculiar to his locality. The more important of these are climate, soil type and condition, labor supply, market demands and transportation facilities, and the system according to which the farm in question is operated.

Climate.— Five of the most important farm crops of North America show a maximum cosmopolitanism, being grown in all 48 States. These are corn, potatoes, oats, tame grasses and alfalfa. In other words, either these are naturally adaptable to a wide range of climatic conditions or, as in the case of corn, plant breeders have developed special varieties and strains to meet the needs of or withstand the conditions in different sections. Of the other cereals, winter wheat has a cultural range of 39 States, rye of 38, barley of 34, buckwheat of 23, and winter wheat of 18, the last two being limited in farm practice to the cooler latitudes — the former to the northeast quarter of the United States and the latter to the North Central and Northwestern States.

Among the forage crops two important grasses — Johnson and Bermuda — also sorghum and teosinte (a corn-like species of recent introduction) are restricted to the South, as are also velvet beans, lespedeza and kudzu, of the legumes. Peanuts, cowpeas and soy beans are also primarily Southern plants though often grown in the Central and Northern States for hay, soiling, silage and other uses in connection with which a matured seed crop is not required. The vetches are correspondingly hardy representatives of the legume forage crops, being grown mainly in the North.

Cotton is definitely limited to the 15 States of the "old South"; rice to 11 Southern States of which three — Louisiana, Texas and Arkansas — include nearly 800,000 of the 900,000 acres that represent an average year's planting; and sugar-cane to an even smaller number, Louisiana being the chief producing centre.

Tobacco has a range of some 24 States east of the Mississippi River, but is grown on but limited areas of most of them. Hops are restricted to a half dozen States in the extreme northeast and northwest sections, not so much because of their climatic requirements as because they are a special and not widely utilized crop. Flax and the root crops — both sugar beets and the sorts grown for stock feeding — are cool weather sorts and are restricted to the northern half of the country, flax to the States of Minnesota, North Dakota and South Dakota. Sweet potatoes are important in the humid sections of the South, especially in the southeastern group of States.

The moisture supply, and, therefore, to a considerable extent the humidity of any locality, is an important limiting factor in the choice of crops to be grown there. Wheat, oats and barley have attained great importance in arid and semi-arid sections where they are grown both under irrigation and, as a result of the development of drought-resisting types, by dry farming methods. Alfalfa because of its deep-rooting habit is the dominant forage crop of dry-farming localities, whereas clovers are practicable only where there is natural or supplied water. Corn is grown both east and west of the 100th meridian which roughly separates the humid from the arid territory of the country, but in the latter the various grain sorghums, milo maize, kaffir corn and similar forms are, because of their drought-defying qualities, more dependable croppers and, therefore, more valuable. As a general thing all the farm crops grown satisfactorily in eastern (humid) United States can be raised with equal, and often with even greater, success under irrigation in the western part of the country. The only per acre yields of potatoes, for instance, to compare with those of the famous Aroostook section of Maine are obtained on the irrigated lands of the far West. Owing to the long growing season in California and the Southwest, alfalfa there yields six or more cuttings a season, whereas three or at most four are all that can be expected in the East. Sugar beets, grasses and the cereals likewise give exceptionally fine returns wherever moisture conditions can be controlled and maintained at the peak of their efficiency.

There is the associated and significant fact that in the West, where dry land and irrigation farming are carried on, the much higher annual percentage of sunshine than in humid sections stimulates all plant growth to the greatest possible extent wherever such conditions as soil fertility and moisture supply are made favorable.

Soil.— The type of soil, though an important factor in the choosing of crops, to be grown on it, is, however, less likely to influence the larger, geographical distribution of farm crops than their location on the individual farm. For the average farm includes usually a variety of soils so that with careful planning different fields can be given up to crops especially suited to the conditions they present.

Thus a stiff, heavy clay or silt will naturally be reserved for grass and grain crops while a lighter, sandy loam will immediately be chosen for corn, potatoes, beans or some such cultivated crop. Of course the most acceptable type of farm soil — a rich, deep, friable loam — will suit and permit a good growth of practically any crop, so the aim of the good farmer is to bring the largest possible acreage into a condition approximately this as nearly as possible with the least delay.

Care should be taken in planting grain and other seed crops on soils abundantly supplied with nitrogenous plant food, since on such their tendency is to develop a growth of straw and leaf surface disproportionate to the seed crop and often so weak as to cause them to «lodge» or break down and mat on the ground. Such crops as hay and other forages, cabbage, silage corn, sugar-cane, and flax and hemp grown for fibre rather than seed, on the other hand, require plenty of nitrogenous stimulus for a maximum growth of tissue.

In the case of soils obviously deficient in plant food or in poor physical condition, it is generally better policy to raise soil-building crops — less valuable, perhaps, in themselves — rather than more valuable and, as a rule, more exacting sorts. Buckwheat, for example, has won a well-deserved reputation as a «poor soil crop» and the first to be planted in subduing newly cleared territory. Field beans are also satisfactory yielders on land that might fail to even pay the expense of cultivating other crops. In contrast to these is tobacco, for which the soil must be carefully picked and equally carefully fitted in every particular.

The successful cultivation of many farm crops is definitely influenced by the degree to which a soil is acid, that is, deficient in lime. While a few species such as beans, corn, flax, rye and millet have been shown by experiment to be practically indifferent to an application of lime to a soil of average quality, practically all others exhibit a distinctly favorable reaction to such treatment. Kentucky blue grass, most of the clovers, and alfalfa are particularly susceptible to acidity, but the soy bean and the peanut are reported by scientists to be able to successfully withstand it to a considerable degree.

Poor drainage is another and a very common weakness of otherwise satisfactory farm crop soils. Water standing near the surface of a soil causes the development of a shallow root system. Then, when the water level sinks in midsummer, the crops are unable to reach it and consequently suffer from an insufficient supply. Rice, which is largely grown according to a system of flooding in the course of which it remains submerged for days at a time, is a striking example of a type of crop unusual in its ability to stand «wet feet.»

Of the more widely distributed crops, alsike clover and red top grass may be mentioned as satisfactory substitutes for other clovers and blue grass and timothy which do not thrive on moist, heavy soils that tend toward acidity. The fact that no crop can suffer as a result of good drainage while many are seriously impeded and injured by a lack of it is ample reason for any farmer installing drains at the first opportunity whatever the crop to be grown.

Labor.—A steadily increasing shortage of farm labor, improved methods whereby crops can be raised by machine rather than man power, and farm implements and sources of power with which such methods may be perfected have, fortunately, developed more or less simultaneously during the last quarter century. Consequently nearly all the important farm crops can now be grown with less man power per acre than ever before, provided the work is done on a sufficiently large scale to justify the employing of the labor saving machinery. Nevertheless the concentration of the labor required by certain crops, whether it be man power or machine power, involves certain problems that must be taken into account in deciding which crops and how many shall be raised on any one farm.

The small grains, for instance, require intensive labor at planting time, harvest time and threshing time, but little or none between. Corn, potatoes, sugar beets and cotton are examples of crops that require constant summer cultivation as well. The root crops and cotton, moreover, call for both early thinning or «chopping,» and also harvesting that can be done only by hand, or at best with hand tools.

Hay crops, on the other hand, may be raised for several years at a cost of one soil fitting and seeding and one or more annual cuttings, mainly at times when other crop or farm work is not pressing. Furthermore, a grass seeding can often be made part of the sowing of a small grain crop to be harvested the year before the first cutting of hay is made.

In the case of alfalfa a favorable location and season may combine to keep a farmer harvesting and curing hay crops throughout a good part of the season. Tobacco involves not only the various tasks of field culture but also the exacting and more or less tedious work of growing the plants in seed beds and planting them out in the field later on. Again, hemp calls for the heaviest and most continuous effort during the preparation and cleaning of the fibre after the crop has been cut.

Consequently the small farmer who must depend mainly on the labor of himself and one or two helpers and limited machinery should avoid a combination of crops of which the busiest seasons correspond or even overlap. Winter rye and winter wheat offer special advantages in that they involve plowing and seeding in the fall and leave the farmer free in the early spring to make preparations for other crops. On the other hand, alfalfa and grass crops may be fitted into a farm schedule either as spring or late summer sown crops.

In some cases the farmer may find it best to complete the handling of a crop all at one time as in the case of corn silage; in others it may be advisable to simply harvest and store it (like wheat, oats, rye or buckwheat) to be threshed out under cover during the greater leisure of midwinter. Hay, too, may be baled for sale in the field, or stacked or stored in a barn to be baled and shipped later in the season if necessary. The problem in any case is to take into account all the conditions that make a crop easy or difficult to grow, both by itself and in relation to other crops, and in regard to local and contemporary conditions.

Shipping.— Market demands and shipping facilities are local problems that must be taken into account by each farmer as his observation and common-sense dictate. Proximity to a large market usually means high priced land, which in turn necessitates crops of relatively high value, although in general farm crops are none of them valuable in the sense that vegetables, flowers, small fruits, etc., are profitable for suburban cultivation. Consequently the problem in most farm sections is one of advantageous shipping facilities rather than one of immediate and nearby sale. Bulky crops such as hay, cotton, sugar-cane and, to a less extent, potatoes are obviously less suited to a location involving a long wagon haul to the railroad or market than are grains, seeds, etc. Many crops, of course, are most advantageously and profitably utilized as feed for livestock and marketed as beef, pork or dairy products. In this connection also there must not be lost sight of the fact that in this way there is kept on the farm a large amount of plant food, in the form of manure, that would otherwise be sold off the place and have to be replaced ultimately by purchased manure or fertilizer. Thus the type of farming followed influences not only the choice of crops grown, but also the maintenance of the fertility of the soil and through that the ultimate possibilities and success of the whole business of the farm.

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FARM AND FARM PROBLEMS. A «farm» is, both in the usage of the United States census and of popular speech, the generic name for any agricultural plot. All separate tracts of land, regardless of size, products or income derived therefrom, which require for their management the services of at least one person during the greater part of the year, are «farms.» The terms «plantation» and «ranch» are widely used in the South and West respectively, and will probably continue to be so, long after these regions have ceased to be differentiated agriculturally from the rest of the country.

A «farmer» is one who farms. And it is common to speak of «the farmer,» meaning the farming class as a whole. There is little, however, to justify such a usage, for there are many and widely divergent types of farming and classes of farmers. The various forms of occupation in industry and commerce are not so regarded merely collectively, and the usage in relation to the farmer has led to misconception and misdirected policy.

The «farm,» the «farmer,» and «farming,» or «agriculture» and «rural life,» in general, have, in spite of the elaborate publications of the Federal and State governments, and the long-continued and widespread discussion of the «rural problem,» received no such comprehensive or discriminating attention as have other aspects of the national economy. Agricultural data do not include the numberless city and village «gardens» with their vast production of vegetables, fruits, flowers and poultry. Fair comparisons with industry are impossible, though such have been repeatedly made and given widespread publicity, too often to the detriment of rural industry and country life.

Even the general statistics of the United States census, however, are amply sufficient to show the outstanding importance of agricultural industry, its steady progress and general prosperity; the social and political importance of the farming class: in general, its leading place as a factor in the national life and in nearly every national problem.

Relatively little attention has been given to comparative study of our rural life with that of Europe and other parts of the world. This remains a real need, both that standards of comparison may be arrived at, and that some of the unique conditions and problems of our agriculture may be appreciated. The more thorough our knowledge of American agriculture historically, comparatively and internally, the more likely is the resultant attitude to be a general, but well-founded, optimism rather than the modified pessimism which seems to have become traditional.

The American farm and farming have many distinctive features, and the farmer very unique conditions and problems. He has shown almost incredible power of adjustment in the pioneer and homesteading stages of the past, and may well again show his accomplishment in the present period of even more marked and complex changes. With various traditions, different nationalities and even races, widely different regional conditions, great and rapid stages of development, such as only a vast virgin continent affords, American agriculture has been a «melting pot» out of which there is only now appearing the form of a system that may be called typical. The upper Mississippi Valley perhaps makes the nearest approach to this in its extent of operations, the employment of machinery, its emphasis of tillage and the forms of its institutional life.

Regional and Other Differences.— There is still, however, wide regional difference which makes it difficult to describe the American farm and farming in any general way. The Northeastern States owe their systems to the transplanting of English individualism and its grass-farming. The agriculture of the Southern States has been profoundly influenced by the aristocratic and feudal traditions, which combined with slavery and the climatic conditions making cotton the central crop have made it almost a separate economy. These traditions persist in spite of the vast changes effected by national development and the Civil War. Less fundamental and permanent have been the Spanish ideas which have had some effect on the West and Southwest. And much less widespread, but important nevertheless, have been the Germanic traditions of the Middle Colonies and later in the Middle West: the influence of irrigation agriculture, especially of the Mormons.

Still, the isolated «farmstead» or «homestead,» miles distant from village centres, may be said to be typical as compared with that elsewhere in the world. The average farm acreage, too, approximating to the original «homestead» of 160 acres, is also characteristic, in contrast with the peasant holdings and great estates of Europe. This «isolation» of the farm homes is accompanied by the dispersion of rural schools and country churches and again forms a striking contrast to the communal organization of European agriculture.

The representative American farm, too, is laid out on the rectangular system, as a result of the original survey. Except in the Northeast and older parts of the South it does not follow the lay of the land, having been traditionally accommodated to the relatively flat and homogeneous prairie country. The fields are also rectangular rather than in the strips so noteworthy abroad, and, though differing in size from 10 acres to 30 acres, depending on the region and type of farming followed, are characterized by their extent and adaptation to machinery. Public roadways are more abundant than in Europe, in general, the farm having a highway on two sides. The cultivated fields are close-in, pastures and wood-lots more remote from the house and barns, which are typically toward the highway side of the farm. The whole lay-out evidences response to our conditions, with traces, however, of traditional usages.

Farm Buildings.— The investment in farm buildings (15 per cent in 1910) is relatively smaller than in older countries, but is steadily increasing. The requirements have undergone and are still undergoing great changes, due to the increased use of machinery, the keeping of more and better stock, superior methods of preparing and using feeding stuffs, and also to the development of fire insurance. The farm-home has undergone less radical changes. The chief tendency evident is to bring the buildings to the centre of the farm, thus emphasing convenience and economy rather than the social aspects so prominent in the arrangement of the older States and older countries. The many separate buildings, erected on the place from time to time with changes in farm methods, also show signs of being brought together, reducing the number and organizing a few for a great variety of uses. The laborer's cottage is coming to be a part of the farm group of buildings; the new style feed lot; the windmill or pumphouse with underground water supply lines; the planting of trees for shade and windbreak; the beginnings of elimination of the old style fence and fencing in general: all are phases of the reorganization of the American farm.

Types and Tendencies.— «Diversified farming» requires the greatest skill in such reorganization, and the changes are most noteworthy where this develops, but the simple organization of the old style Southern plantation, as well as the small New England farm, are also being adapted.

The one-family farm of tradition is also passing. More farmable and manageable areas suited to latter-day conditions are being rapidly differentiated. New types of farm-units are appearing which will relieve the struggle for existence which many American farms have been experiencing because of too rigid adherence to the traditions. Present-day processes are greatly modifying not only the size of the farm but its internal organization and external relations.

There is undoubtedly to be an increasing place for the very small farm. These small and intensively tilled farms will necessarily be near centres of population where the farmer can handle his own market; and where he will produce high class specialties. Such farms are ideal, but although they give great economic independence, they also require great executive skill. Popular fancy has indeed over-appreciated this opportunity; many city people have come to grief in such experiments; and it has been the goal of most «back to the land» schemes.

Another type of small farm, much more common, and characteristic of our conditions, is the one-man farm, where the owner does the work himself (and his family) with little equipment. These are generally on low-priced land, and devoted to the universal staples, risk being reduced to a minimum. This narrow and traditional type of farming seldom produces the best results for the individual or for the community.

Still another type is the representative farm of 160 acres, which is managed with comparatively little outside help, but where the soil is good, the equipment ample, live-stock is kept and relatively little land maintained in tillage. Skill in «management» makes these profitable, and results in a prosperous and successful farm.

Both the «plantations» of the South and the «bonanza farms» or «ranches» of the West are being disintegrated. And throughout the country, while the *average* acreage per farm steadily decreases, the *representative* farm meanwhile continues large. In some regions consolidation is active; in others, subdivision. Both economic and social purposes are being realized in this process: a sufficient acreage for most profitable farming under our conditions and a means of retaining «on the land» the oncoming generations of the farm families.

But this necessarily involves a more «intensive agriculture.» The «making of a farm» has been succeeded by the «producing of crops» and is now being replaced by «marketing» as the cardinal farm problem. In the past, American agriculture has been controlled by the ideal of «bumper crops.» Now, the farmer is realizing, under leadership, that the crop must be «worth what it costs.» The days of cheap and rich land are past.

Present conditions and tendencies are indicated by the general statistics of agriculture presented in the census of 1910. These showed 6,361,502 farms with an average acreage of 138.1, of which 75.2 acres was improved land. The acreage increased only 48 per cent since 1900. The value of farm property (total value $40,991,449,090) had risen 100.5 per cent in the decade, and that of land alone from $15.57 to $32.40 per acre.

These figures show the wide opportunity for more intensive farming, as well as its necessity, with the practical exhaustion of new lands, and the rapid rise of values resulting from increased productivity as well as speculation. They also indicate that the American farmer is still essentially a «cheap land» farmer.

The population data of the same census also show that the rural population (49,344,883) increased by only 11.2 per cent while the urban increase for a corresponding population (42,623,383) was three-fold (34.8). This represents the climax of a long process of «rural depopulation» as the result of unsatisfactory economic and social conditions.

For while great progress has been made in American farming and farm life from colonial days to the present, and the United States Department of Agriculture, as well as the semi-official Country Life Commission (1908), can announce a «general prosperity,» yet conditions have always been, alike in the oldest as in the newest parts of the country, not wholly desirable, and the contrast with city and industrial conditions growingly close and apparent. The country never has lost as a whole, although different States and localities have. On the contrary there has been a steady and wholesome gain in population. But the great «agricultural shift» from East to West, along with some movement from the farm to the town and city, has had correlated with it certain elements of «decadence,» both economic and social. And these have been sufficiently intensive to give rise, in certain times and places, to «agrarian discontent,» often approaching violence, and at last finding expression in political activity, and to occasion the rise of a «rural problem» throughout the country.

The end of an epoch in American agriculture and rural life was reached with the practical passage of the free land frontier in the years after 1890. The acreage of farm land which had doubled from 1860 to 1900 increased by less than 5 per cent in the next 10 years. The cities continued to grow; the demand for agricultural products both at home and abroad increased. «Rural depopulation» had to be corrected and the era of «intensive farming» entered upon.

An early sign of the new order is the disappearance of the agricultural «belts» which had characterized our «exploitive agriculture» of the past. The South is steadily diversifying its crops; the West is passing from the condition of range country; stock-raising is spreading; dairying and horticulture are being found in all parts of the country where general opportunity offers. A great variety of agricultural specialties are appearing locally. The areas devoted to different crops have been greatly extended.

There has been an especially noteworthy development associated with the rise of vast urban markets. In the vicinity of all the large cities «market gardening» has become a most profitable branch of agriculture and represents the climax of intensive culture. And not less remarkable is the use of «truck farming,» carried on in places remote from markets, producing the greater proportion of vegetables consumed in cities from 500 to 1,000 miles distant. The South Atlantic States are particularly interested in this industry.

The great growth of the cities has also been responsible for the rise of a new and effective type of dairying. The milk and other dairy products for cities are produced not only in the immediate neighborhood but often in regions quite distant, by the aid of the new system of creameries, and elaborate arrangements for transportation. Certain States (New York, Iowa, Illinois, Pennsylvania, Arkansas and Ohio) have become leading «dairy States,» and already dairying is the chief industry in a number of States. The use of the silo has been an important aid in this development, as well as is the new stock-raising in general. Dairying has as yet received little development in the South, but beginnings are being made.

But the most notable, and certainly the most fundamental change, has been in the development of «animal husbandry.» The live-stock industry spread west with the opening up of the country and to-day remains quite strongly localized in the West and Middle West. These, however, are not the regions necessarily the best adapted to it, nor will it permanently remain there. Its localization is the result of the presence of the «public range» and the «corn belt.» The development of «stall-feeding,» with the «concentrated foods,» gave the Mid-West the advantage over the region of better «grasses» and water-supply, but this region is learning to produce its own foods. The East and South are already beginning to see the spread of the live-stock industry.

Nor are we any longer bound so closely to a fruit-belt as in the past. Fruit growing has escaped the small «orchard,» as a mere subdivision of the average farm, and has became a business by itself. The most marked departure of recent years has been its extension on a large scale in Georgia, Texas and the Southern States. A rapid growth of fruit growing on a large scale in the new lands of the Northwest is also proceeding. Systems of transportation, refrigeration, storage and marketing have been worked out and the manufacture of fruit in «canneries» has grown to large dimensions.

Other forms of special agricultural industries, such as the breeding of animals, fruit culture, poultry raising and bee-keeping, have also made great progress in recent years. Already these minor crops and products outrank collectively and even in some cases individually the staple field crops. The centre of gravity of American agricultural production is plainly shifting with the rise of a more intensive agriculture. Diversification also involves more varied and complex system of «crop-rotation,» which in turn enables labor and equipment to be more economically managed and allows of their freer use, thus enlarging the sphere of «farm management» and developing farm «leadership.»

From its aboriginal and pioneer state, American agriculture has had a relatively short, but rich and eventful, history. Some agricultural progress had been made before the coming of the whites, and the first settlers profited by this. Corn was from the first a staple, as it had been for the Indian. But the forests made progress slow, and for two centuries the superabundant natural resources failed to bring any great increase in the products. As late as 1845 our farms did not produce enough wheat for our bread. The period 1830–60 was however revolutionary, in the rise of markets, better transportation giving access to them; the use of farm machinery; improved live-stock; and the rise of the agricultural fair. Later developments have been merely an extension along these lines. The opening of the Mississippi Valley, both north and south, to agriculture gave the industry the general form which it maintains to-day. Other grains than corn were produced early, but only in the West did it become one of the great crops. Live-stock was produced everywhere, but only found its full development in the new West. Tobacco, early grown and for export, gave place to cotton as the alluvial lands of the lower Mississippi were opened up. The wool industry received its first impetus from the introduction of the Merino sheep, but has achieved its greatest success in the new Northwest. The sugar cane was introduced in the middle of the 18th century in Louisiana, and soon developed a successful manufacture of sugar, finally producing one-half of our domestic supply. But about 1900 the sugar beet industry, begun in Colorado, Michigan, California and other States, began a rapid rise (doubling the number of factories 1900–14) and is rapidly becoming capable of supplying the entire demand. Rice is now grown, profitably and widely, especially in Texas and Louisiana, and is capable of great extension. Many varieties of tropical and subtropical products are being grown in Florida and California, but this is only in its beginnings. Immense orchards are appearing in the new States of the Northwest.

As a result, the United States ranks high in the production of the world's staple agricultural products. Even in its present undeveloped condition it may be said to be the world's agricultural state. For here is produced three-fourths of the world's maize crop, two-thirds of its cotton and one-fifth of its wheat. Export of farm products trebled in the last generation and under war conditions has grown enormously, assisted by a fundamental revision of food habits at home, but the increase is not in *quantity* but rather in *value*. It represents, too, rather extent of new land brought under cultivation, than permanent increased efficiency in farming. Cotton and breadstuffs lead, followed by meat and dairy products and animals. These have been our most successful and staple products in the immediate past, but a thoroughgoing reorganiztion of our agriculture is necessary if we are to maintain our growth and add new elements to our surplus for export. With practically one-half of the present farm area unimproved and with the many lines of leadership already entered upon, this ought not to be impossible.

Factors of Future Development.— It has been said that there are still three great opportunities in American agriculture, viz., the rice lands of Texas, the timber lands of Oregon and the new wheat lands of the Northwest. But there is opportunity, not only as here for investment in and development of new lands, but in all parts, even in the oldest States, in fact, wherever a good crop can be grown and a good market can be found. This fact is at the bottom of the "back to the land" and "buy a farm" movements to-day. These movements, however, are chiefly of significance as an appreciation of the real worth of country life, for it must be confessed that the opportunity of to-day can only be surely availed of by those of farming and tradition. Never was farming so difficult. It will be in those whom country life will keep on the farm, and not in those who come to it, that the strength of the "new agriculture" will lie. The immigrant, however, is coming upon the land, and would seem ideally adapted to its future needs.

Since 1880, irrigation has been employed on a large scale in reclamation of the arid region which covers nearly one-third of the country. Already some 14,000,000 acres are irrigated and producing varied and valuable crops, as well as conducing to a high type of local life. State laws and administration in the dozen States affected, with the National Reclamation Act of 1902, have reclaimed large areas and ultimately more than one-tenth of the entire area will be under cultivation. Not only reservoirs, but pumping and artesian supplies are being used. The new ideas and practices of irrigation farming will have great influence upon agriculture in the older States and hasten the coming of intensive farming.

Improved methods of cultivation are making it possible to grow crops by "dry farming" on the portions of the arid region hitherto considered irreclaimable.

An ever more important phase of the conservation of national resources, directly affecting agricultural progress, is drainage. At least 100,000,000 acres of land, well located and rich, but wholly or partially unproductive, because in swamps or overflowed seasonably, may be reclaimed by the co-operation of private owners, aided by State and national action. Much has been done in various States, but the work has barely begun. Even "tile drainage," the need for which is very wide spread, has since its introduction in 1835 not progressed as it should. The farmer by tradition leaves too much to nature; the future demands scientific agriculture all round.

Larger returns from land already in use, even more than bringing new lands under cultivation, will chiefly characterize future farming. We may expect to see irrigation even in the humid region (where rainfall, although sufficient in amount, is unevenly distributed) brought into use, as in Europe, as insurance against drought, and as a means of increasing production. Fertilizers are rapidly coming into use where the virginal fertility is lessening owing to single-cropping or a too simple system of rotation, combined with poor tillage. Soil fertility is increasingly guarded by stock-raising, and though soil making is still in its infancy here, as contrasted with Europe, yet better tillage, longer rotation series and better husbandry all round are inevitable, and may forestall the universal need for artificial and commercial fertilizer. Not only will the soil be safeguarded, but better husbandry will, as experience shows, save the stock and crops from diseases and pests, such as "cattle tick" and the "cotton boll weevil."

An industry so old and so controlled by custom as agriculture, and which has come to be regarded as characterized above all by stability, does not frankly or readily accept change. But the very foundations of American agriculture have been continuously shifting with the various stages of evolution from pioneer to well-settled condition, the movements of population, the advent of machinery, the shifting of regions of production, the rise of markets, the assimilation of foreign immigrants on the land, the adjustment of the freed negro.

The epochal changes since 1890 have resulted in many maladjustments, giving rise even to alarm, and to a widespread discontent with the agricultural status. All this constitutes the «rural problem» of the present.

An early and significant aspect of the problem was the «abandoned farm.» As early as 1840, but more widely about 1875, press and platform discussed the deserted farm, particularly in New England, but to some degree throughout the older States of the East. The double attraction of the cheap and rich Western lands, and the call of the rising industrial cities, combined with a difficult soil, and partly the disturbing influences of the Civil War, made the condition active and alarming. The State governments were moved to take action about 1889. Investigation showed no wholesale abandonment, although some 5,000,000 acres, mainly improved, had been from time to time abandoned; the causes were seen to be general, not local; that agriculture was not decadent except relatively with the profits of farming in other regions and other kinds of business; in general, that it was *changing,* but not *declining.* Later experience has shown the same phenomena in other parts, even in some of the newest and most prosperous farming regions, and the whole matter has come to be regarded as simply one of the many striking evidences of the sweeping and radical changes our agriculture and rural life is at present undergoing. The reoccupation of these lands is almost complete, and Eastern land values have arisen sharply, products increased with intensive agriculture, prosperity followed from the access to great urban markets, and every phase of rural social betterment, for example, the centralization and consolidation of schools; the new country church, social and federated; traveling libraries; the «good roads movement» and the Grange have been most active. The transformation of farming and farm life in the East gives promise of successful readjustment elsewhere. Above all it shows the necessity for perspective in judging American agriculture.

In New England also the phenomena of rural depopulation first appeared, but like the abandonment of farms was soon seen to be symptomatic of the great «agricultural shift» of an expanding and developing country, that although it often had serious social consequences in the disruption of the farm family, the country school and country church, it always represented rather a movement from one farming region to another for the realization of better conditions and opportunity, and that it never was largely due to the superior attractiveness of industry and city life, for these called only the few — often the élite, but also many undesirable elements — and never the vast majority of shifting farmers. All parts, except the very newest States, have at some time, and in some degree, been affected thus, and the richest agricultural State, Iowa, actually suffered slight loss in total population due to rural decrease.

This agricultural shifting, so caused, is now over, however, and the new intensive agriculture, with the rising farm villages, will doubtless absorb the surplus farming population. The present opportunity on the farm is great, it calls for the freer use of labor, machinery, capital and the exercise of management, as well as for better social institutions, and political reorganization, and though difficult, offers attractions at least as great as those of industry and commerce.

These new conditions may also well lessen the movement of «retired farmers.» This practice is distinctive of American farming, in contrast with the permanent agriculture of Europe; it has occurred in all parts of the country, but particularly in the Middle States, and mainly as the result of the doubling of land values in the last decade. This has enabled not only aged farmers to retire from the hardships of pioneer and homestead farming, but also the younger generation to go into town with a small fortune for investment. The retiring farmer has always largely entered the smaller cities, and though often inactive and unprogressive, has latterly usually entered into active business, and become the builder of our country towns. More and more they seek the business opportunity of the nearby town or village, less seldom sell the farm and more often rent it, thus furnishing a vital connecting link between town and country. Conditions are increasingly in favor of a relative cessation of the whole movement.

One noteworthy result of these phases of the agricultural shift has been the appearance of «tenancy.» Its rise and rapid increase in a new country like the United States, which in 1880 showed three-fourths of the farmers owners, and to-day over one-third renters, naturally produced discussion and even alarm. It is most frequent in the South, where the presence of the negro occasions its prevalence. It was rare in Colonial days, and even in the pioneering of the first Western States, for the owners of large land holdings sold to small owners. About the time of the Civil War tenancy became a method of acquiring ownership as land values rose. It was regarded as a mere step, not as a status. The laborer or small investor could begin with enough to equip and pay some or all of the cheap, but rising, price. As these conditions were intensified tenancy increased at an accelerated rate; the retiring farmer grew increasingly common; «cash tenancy» became frequent; but latterly «landlordism» with «share tenancy» in some form (now twice as common as the cash system) infrequently the «manager plan,» characterizes the system. Fortunately there are but a few very large «estates,» and «absentee landlordism» has hardly appeared, the landlord seldom being outside the county, and often not farther than the nearest town. With free or cheap land practically gone, and rising values, the process of tenancy to ownership is increasingly difficult and long, but still many succeed and we have not yet reached the condition of some older countries where the laborer seldom attempts tenancy or the tenant ventures for ownership.

Inheritance has latterly become an important factor in the acquiring of land ownership. Farmers who are well-to-do usually assist their sons in acquiring land; often the family farm is added to, as the sons grow to maturity, and finally parceled out. The prevalence of part-owned, part-rented farms is evidence of this process. The increase of this necessity and policy will give a new stability to the farm family and domestic relations, by giving marriage, birth and death, as well as general social relationships, an economic sanction.

A better perspective on these features of the present transition stage show that the repressive causes that tended to inertia, and even decadence, in agriculture, and virtually created a crisis, are already passing, and a new era to be safely entered upon. The year 1887 may be regarded as the beginning of this period of reorganization for it was characterized by the practical exhaustion of the public lands, the beginnings of a more intensive agriculture in the East and Central States, a rapid rise in land values, the development of irrigation and drainage schemes, and increased activity along all lines of educational and governmental help for the farmer. Conditions during the last decade of the last century were still difficult, despite many steps in rural progress, and never was discussion and agitation more active. The comprehensive appraisement of farm life and conditions by the Roosevelt «Commission on Country Life» in 1908 made the report that though in a general way the American farmer was never more prosperous, yet that agriculture was «not economically so profitable as it is entitled to be for the labor and energy the farmer expends and the risks he assumes.» The social disadvantages resulting were also indicated, and the three great needs were summarized as (1) effective co-operation to put the farmer on a level with the organized interests with which he has to deal, (2) schools which will prepare children for country life, and (3) better means of communication.

Consequently the lines along which improvement is being sought are (1) decreasing the isolation, and hence the unco-operative individualism of the farmer by the extension of rural free delivery of mail, adding parcels post, increase of rural telephones, the continued improvement of roads, and increasing availability of the automobile, (2) the redirection of agricultural education, to educate the boy and girl toward, rather than away from, the farm, and (3) efforts to increase agricultural credit facilities, and to organize farmers for mutual benefit in matters of labor and marketing especially.

A discussion of fundamentals in the economic and social life of the farmer was developed. It has been found that it is with reference to floating capital — labor and credit — that agriculture meets other forms of business in fundamental competition. «Farm management» has found new farms utilized to their most profitable capacity, for constant and widespread lack of these two things. Throughout the history of American farming, labor has been lacking, partly due to the general scarcity of labor in a new and developing country, but also to the one-family, or one-man, farm tradition. The advent of machinery rather made possible Mid-West agriculture without a corresponding labor force, but did not lessen the need for it. During the years from 1880 to date the farm labor class has increased more than 40 per cent, while the proprietors increased only 35 per cent, and in the cereal States, where the machinery was most used, labor increased three-fold, as rapidly as the proprietors. The labor question is not peculiar to agriculture, but, although the data are incomplete, it would seem that so far as wage increase relative to cost of living is concerned, the farm laborer has not made equal progress with other branches of labor. The passage of slave labor, and also of the traditional one-man farm, where the farmer's family constituted the labor force, has made the labor problem an imminent one, especially with the demands for increased production and the call to the various forms of intensive farming. The real solution is for the farmer to train farm artisans from the rising generation of farm youth not only of those at home but those from the landless generations of the older States, and many village youths. The farmer of the new agriculture cannot rely on the mere co-operation of neighbors, nor upon transient and occasional help, but must provide all-round-the-year employment, the possibility of a home and some social attractions for the laborer. The new agriculture calls loudly for a freer application of labor, and its attainment would benefit owners, tenants and labor alike.

So also is credit a great desideratum. It is needed to pay for labor and to conduct farm operations under the new system. Thousands of farmers are hampered for the lack of it, and lose each year many times the interest charge on the capital needed. Moreover credit is a most important means of acquiring land ownership. It is often more desirable to pay interest than to pay rent, and this would be more frequently true but for the evil system of «double taxation» still prevalent.

The country store as the original credit institution of the American farmer has been superseded, except in the negro farming regions of the South, by the local bank. These are everywhere found, but are frankly commercial and profit-making. In fact, neither personal nor mortgage credit institutions have reached a satisfactory stage of development, and little to compare with the Raffeisen system of Europe has yet appeared. In the corn belt the life insurance companies have loaned largely on farm mortgages. Elsewhere the local banks furnish the only facilities, with the attendant evils of high interest and frequent foreclosures. Since 1910, however, there has been extensive agitation and an official commission went to Europe in 1913, with the result of attempted Congressional action, some State laws favoring credit societies, and action in a number of Western States to allow the loaning of certain State funds (e.g., school moneys) on mortgage. In response to the general agitation many joint stock-loan companies have been organized in Middle Western States.

The need for credit is evident from the fact that the old tradition regarding the undesirability of mortgages has been latterly lost in view of their indispensability under our system of agriculture to-day. There has been no comprehensive report by the government since 1890, but even at that time 18.6 per cent of all farms were encumbered to one-third of their value. Infrequent in the South, one-half of all the mortgage encumbrance was centred in New York, Pennsylvania, Ohio, Illinois, Iowa and Kansas. The average duration of the mortgage was five years, and only about 3 per cent were indicated as foreclosed, the vast majority of all the adventures being thus of successful issue.

It is doubtful if co-operative credit institutions of the European variety will become common here, but the need for new credit will be met by greater local control of the local banks, associated with local distribution of funds through the Federal Reserve system. This will provide a solution more in harmony with our need and the individualistic traditions of our farming population.

Along all lines the need for organization is being felt, not only in matters of business but in re-creating rural social institutions and reorganizing local politics. The early appearance, widespread scope and great variety of farmer's associations is evidence that the farmer is not incapable of organization, but that wherever he feels the need and recognizes the possibility of results he is ready. For more than a century there have been local, State and even national associations for promoting agriculture. Soon after 1800 the «fair» took its rise and now over 3,000 fairs are annually conducted, devoted to general, as well as special, farming interests. The great majority of farmers' organizations have been directed to some form of business co-operation, and often for this sole purpose. In 1908 it was estimated that there were 85,000 co-operative organizations with a membership of more than 3,000,000. About 30,000 were irrigation associations, and others were co-operative telephone companies, grain elevators, creameries, insurance companies, associations for marketing and for the purchase of supplies. In 1913 the United States Department of Agriculture established a Rural Organization Service to assist farmers and farmers' organizations. Several associations have at various times assumed a position of leadership among the rest and even reached the status of a political party. Especially should be mentioned the «Grange,» or Patrons of Husbandry, the «Farmers' Alliance,» and the «Farmers' National Congress.» But although these serve a useful purpose in subserving the larger interests of the farmer they cannot take the place of thorough going local reorganization in the home community alike for social, business and political needs.

Education and leadership have always been at a premium in American agriculture. Rapid changes of condition, with the necessity for abrupt and radical changes of idea and practice in farming, make them vitally necessary. Agricultural education developed from the top down, the agricultural college and experiment station first appearing, and only recently agricultural high schools, the introduction of agriculture into the common schools, the short course and the general extension services. Farmers' institutes have long been widespread and active, the agricultural press has become a powerful and permeating influence, and above all the multitudinous activities of the United States Department of Agriculture leaves little to be desired in the way of adequate leadership.

Locally the new country school, especially where consolidated, and the new country church, have become centres of community leadership and wider social service. Reorganization of the social institutions of our farming population is perhaps the most backward phase of rural progress. But its importance is being recognized; more than half of all the school children in the nation are in country schools, and nearly two-thirds of all the churches are in country or village, and the lines of reorganization are clearly seen.

There is danger that the fundamental importance of the family may be overlooked. The traditional American farm was a family unit; rural social organization has always been patriarchal; social life in the country in the past has centred in the home. But later conditions associated with the shift of farming population disintegrated the rural family, and to-day a lowering birthrate, prevalent divorce, many unmarried, though of marriageable age, may be said to characterize it. The new agriculture calls for reform in the domestic relations on the farm, and is a problem no less pressing than that of the school and the church.

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FARM LABOR. See Farm and Farm Problems; Farm Crops; Farm Management.

FARM LOAN ASSOCIATIONS. See Federal Farm Loan Act.

FARM LOAN BANK. See Federal Farm Loan Act; Land Credit; Co-Operative Banking.

FARM MACHINERY. The function of farm machinery is to enable the farmer to produce not only larger crops but better crops than he can with only his simple hand tools. In fact, without the aid of such machinery the farmer of the present day finds it difficult to earn more than a bare living for an average family.

The machinery employed in modern farming falls naturally into four groups: (1) tilling machines, which prepare the soil to receive the seed; (2) drills, seeders and planters, for placing the seed in the ground; (3) cultivators, for working the growing crop; and (4) harvesting machines, for gathering the matured crop. In the first group belong the plows, harrows, drags and rollers; in the second, the grain and seed drills, the corn-planters and the potato-planters; in the third, the various forms of horse weeders, wheel-hose, fertilizer drills, corn-plows, etc.; and in the fourth, the corn-binders and huskers, the potato diggers, the mowing machines, reapers and binders, the hay rakes and tedders, hay loaders and trolley-forks, fanning mills, corn-shellers and the like.

Tilling Machines.— The plow is the foundational instrument of all agriculture, and it has been brought to its present state of scientific perfection only after tireless experimentation. The farmer of to-day finds at his disposal a long line of special purpose plows from which he may select the one best adapted to the soil he wishes to work, and to the condition in which the soil may be at the moment. On the ordinary farm, however, there will be found three types of plow, the sod plow with a long moldboard and a strong twist; the stubble plow, with a shorter moldboard and much less twist; and the corn cultivating plow, which approaches much more closely the simple wedge shape. The sod plow is designed not only to tear up the sod and turn it upside down, but also to break up thoroughly the texture of the earth clod. It is much more effective if it has a jointer attached. The jointer has the shape and form of a little plow, and gives the sod its first turn, allowing the plow itself to exert the desired shattering effect. The stubble plow is used to break up land which was in cultivation the previous season. Its particular office is to break up and loosen the soil rather than to turn it over although its action partakes also of the turning movement. These two forms do most of the plowing on the average farm. The draft varies from 400 to 600 pounds, according to the condition and constitution of the soil, and should be provided with such a number of horses, that each may have no more than a 200-pound pull. More than that tires the team to such an extent that the efficiency of the machinery is seriously reduced. These plows are also combined into "gangs" of two plows or more, and when the motive power is a traction engine, many furrows may be turned at once. With a four-furrow gang plow and five horses one man can break up from five to seven acres per day. A gang of 10 to 20 plows drawn by a traction engine, with two men in attendance, will plow up to 50 acres per day. (See PLOW). Following the plow comes the harrow, and of this machine also there are many types, adapted to the soil to be worked and the crop to be raised. The object of the harrow is to reduce the soil to a condition of fineness in which the tender roots from the newly germinated seed will find least resistance, and at the same time an abundance of air and moisture in the interspaces. To get the best results from the harrow it should be sent on to the plowed ground as soon after the plow has passed as may be. The ordinary spike-tooth harrow is a very effective tool, and if it has long teeth which may be set for deep working it is quite sufficient for most soils. The spring-tooth and disc harrows have particular uses on special soils, and for very lumpy soils a clod-crusher is of great service, to precede the harrow. The drag or planker is used to smooth off uneven parts of the harrowed field, and if the soil is very light and fluffy, the roller is indispensable to produce a seedbed sufficiently compact to hold moisture through the germination period.

Seeders and Planters.— The ordinary grain drill consists of a long transverse bin with a series of 11 spouts set five inches apart. These spouts furrow the ground as the drill is pulled along, drop the seed in the furrow and cover it to the required depth. Where the soil is so light that it dries out quickly, a pressure wheel may be attached to firm the covering soil over the seed. The feeding gates in the bin of the drill may be adjusted to openings of different sizes, so as to sow beans and corn, as well as all smaller seeds. In order to space the seeding properly some of the spouts are closed. For example, in sowing mangels, spouts numbered 1, 5 and 9 are allowed to remain open; in sowing beans, spouts 1, 6 and 11 do the work. Beans may be sown in double rows for field culture by allowing spouts 1 and 3, and 9 and 11 to remain open. Corn is usually sown with spouts 2 and 10. There are special corn-planters which sow the grain in hills, five or six grains at a time, but the hand-planted cornfield still holds all the records for big crops. Potato-planters are of advantage when more than five acres are to be planted: with less than that the cost of the machine for the very few days in the year when it is at work is prohibitive. Drills are also of great usefulness in the sowing evenly of lime and commercial fertilizers. The disc drill is a combination disc plow and seed drill. The discs plow the land sufficiently for grain without other preparation and the grain is sown at the same time.

Cultivators.— The functions of the cultivator are threefold: to prevent the growth of weeds, to modify the moisture conditions, and to add a dressing of fertilizer to the soil while the crop is growing. A tilting-tooth harrow is an effective form of cultivator when the crop is small. It can be so driven as to straddle the crop rows while it tears up and destroys thousands of weeds. As the crop becomes larger the horse weeder comes into use. It resembles the harrow in general make-up, but has very long slender spring tines instead of the stocky teeth of the former. The depth to which these tines penetrate is governed by setting the wheels of the machine. For specific crops there are special types of cultivators, with shovel-teeth, wide scuffle-blades and narrow hoe-blades, miniature plowshares for earthing up the plants, discs for deep stirring, etc., in great variety. In light soils the cultivators are sent into the field after every rain to break up the surface and thus form a mulch to conserve the moisture. Several of these machines are made small and light, for hand use.

Harvesting Machines.— The complicated machines used in harvesting operations are the most expensive in the farm's equipment, in spite of the fact that every effort is made by the manufacturers to keep the price down, while producing a machine of the highest efficiency. The great disadvantage attaching to farm machinery is that the use of any particular machine is limited to a few days during the year, and it thus takes on the character of an expensive per diem luxury. Thus the haymaking machinery — the mowers, tedders, rakes, loaders, stackers, etc.— must earn their pro rata cost within a very brief period. And the horses to operate them must be at hand when the crop is ready, even if the farm provides insufficient work for them for the remainder of the year. The relative per diem cost of farm machinery depends largely upon the size of the area devoted to a particular crop. For example, a grain drill used to sow only 20 acres annually, costs $2.97 per day it is in use: if 107 acres are sown the per diem cost is $1.04. Where 15 acres of grain are harvested, the grain-binder's cost annually per day's use figures at $8.15. If, however, the grain-growing area is 85 acres, the annual per diem cost is $2.41. The corn-binder is more expensive by 40 per cent, and the corn-shocker by 300 per cent. These high relative figures have the tendency to induce specialization in the main crop for which the machinery must be provided. The problem is partially solved by farmers' associations which buy the machinery and distribute its use equitably among the members. In this way a traction engine may be economically used to provide power for rapid work. The traction engine cannot be profitably employed on a farm area of less than 240 acres.

Farm Equipment.— The usual machinery equipment of a well-regulated farm of 160 acres consists of the following: 1 manure spreader; 1 walking plow; 1 riding gang plow; 1 smoothing harrow; 1 disc harrow; 1 plank drag; 1 land roller; 1 seed drill; 2 cultivators; 1 corn-planter; 1 mowing machine; 1 hay tedder; 1 hay rake; 1 hay loader; 1 corn-binder; 1 grain-binder; 1 potato digger. Two heavy farm wagons and a hay rack will be needed to handle the crops, fertilizer, etc. The cost of this equipment will come near to $900. The annual cost per acre of these tools figures about as follows: walking plow, 7.2 cents; gang plow, 18.3 cents; smoothing harrow, 1.9 cents; disc harrow, 4.9 cents; plank drag, 0.8 cents; roller, 2 cents; cultivator, 4.3 cents; horse-weeder, 3.3 cents; corn-planter, 8.1 cents; seed drill, 13 cents; mowing machine, 10.5 cents; tedder, 16.4 cents; hay rake, 5.5 cents; hay loader, 24.8 cents; grain-binder, 26.4 cents; corn-binder, 36.9 cents; corn-shocker, 84.2 cents.

Performance.— The per diem performance of farm machinery depends somewhat upon the power used. Many of the machines are of too heavy a draught for two horses to work with steadily, and yet three horses will not accomplish 50 per cent more in a day than will two, and in general require another man. The figures as worked out by the United States Bureau of Agriculture are as follows:

	Acres per day
12-inch walking plow, 2 horses	1.75
14-inch walking plow, 3 horses	2.32
14-inch riding plow, 3 horses	2.49
8-foot spike-tooth harrow, 2 horses	10.80
10-foot spike-tooth harrow, 3 horses	15.30
6-foot disc harrow, 3 horses	7.50
8-foot disc harrow, 4 horses	12.80
6-foot spring-tooth harrow, 3 horses	8.20
8-foot spring-tooth harrow, 4 horses	13.10
8-foot roller, 2 horses	13.20
6-foot grain drill, 2 horses	8.80
6-foot grain reaper and binder, 3 horses	11.10
Hand corn-planter, 1 man	4.40
1-row corn-planter, 1 horse	6.90
2-row corn-planter, 2 horses	13.60
Cultivator, 1 horse	4.40
Cultivator, 2 horses	6.60
6-foot corn-binder, 3 horses	7.30
5-foot cut mowing machine, 2 horses	8.90
Hay rake, 1 horse	16.30
Hay rake, 2 horses	17.90
Hay tedder, 2 horses	14.50
Bean harvester, 2 horses	7.60
Threshing machine, 10 men, 6 horses	29.50
Manure spreader, 2 horses (13 loads)	1.70

A motor plow will break up from 1.29 to 1.63 acres per hour; a tractor and gang plow, 0.74 to 2.18 acres per hour; two engines and a cable plow, 1.04 to 1.25 acres per hour.

Comparisons of the statistics of the crops of 1850 with those of 1910 have shown that the saving to the American farmer in labor-time in the 60 years increased his potential efficiency by 2,000 per cent. To instance a few of the more common farm processes: a quantity of grain may be sown to-day in 33 minutes that formerly required 10 hours and 36 minutes; and a job of harvesting can be done in 1 hour that would have taken 46 hours and 40 minutes in 1850. A planting of corn which now requires but 37 minutes then required 6 hours and 15 minutes; and a husking job which now is completed in 3 hours and 36 minutes would then have consumed 66 hours. The mowing machine does in 1 hour what the scythe will hardly do in 7 hours; and the potato planter does in 1 hour the work which formerly took 8 hours with a hand hoe. A bushel of wheat can now be raised with the expenditure of but 10 minutes of the farmer's time; in 1850 it required an average of 3 hours and 3 minutes. Statistics show also the interesting fact that where the farm is generously supplied with machinery, the farm income is much enlarged. For example, in Florida, where the value of the machinery on the farms averages $30.43, the yearly income of the farm-worker averages $119.72; in Iowa, with machinery averaging $196.55 to the farm, the farm-worker's average annual income is $611.11; in North Dakota, where the machinery averages a value of $238.84 per farm, the average income per farm-worker is $755.62.

Production.— In no other country in the world is there such extensive use of farm machinery as in the United States. According to the census of 1910 the total value of such machinery was $1,265,149,783, an increase of $515,373,813 (68.7 per cent), over the figures for 1900, and 734.6 per cent greater than those for 1850. In 1910 farm machinery constituted 3.1 per cent of all farm wealth. Measured on the basis of area, for every acre of improved farm land in the United States there was on the the farms in that year a value of $2.64 in machinery. The production of farm machinery in the United States in 1914 amounted to a value of $168,120,632. The exports for that year were valued at $31,965,789. (See AGRICULTURE; DAIRY PRODUCTS; FARM POWER; STOCK RAISING). Consult Davidson, J. B., 'Agricultural Engineering' (Saint Paul, Minn., 1914); King, F. H., 'Physics of Agriculture' (Madison, Wis., 1901); Warren, G. F., 'Farm Management' (New York 1915); United States Department of Agriculture, 'Bulletin 412' (Washington 1916).

FARM MANAGEMENT. Farm management may be defined as the science of the organization and management of a farm for the purpose of securing the greatest continuous profit. Many farmers have learned the art of farm management without clearly understanding the principles involved; just as a farmer may get a good crop of corn if he plants by the moon, if this happens to be the right time. If the corn is planted at the right time it grows just the same, regardless of the explanation that the farmer makes. But the farmer who understands the principles of farm management will be able to adapt his farming to new conditions more readily than will a farmer who acts by rule.

A good farmer must be a skilled husbandman in the care of his crops and animals. He must invest his available capital and credit with discretion. Between many things that are needed he must choose the most essential, considering his capital. He must follow the most profitable type of farming for his conditions, and must have the right number of each class of animals and the right area of each kind of crops. He must know the right amount and kind of labor for his conditions. Must so arrange his buildings and fields that they can be most profitably operated. The above are but a few of the management problems that confront the farmer.

Choosing a Farm.— One of the most important decisions that a farmer ever makes is in his choice of a farm. So many details must be considered that unless one has had experience in buying farms he is likely to forget some of the details even though he may be an experienced farmer. Below will be found some of the questions which should be carefully considered by the purchaser in selecting a farm. If one expects to make a living on the farm, the crop-producing power of the soil is the basic factor. There are some exceptions, but ordinarily what grows out of the ground determines whether or not one has a chance to make a profit.

SIZE
1. Adapted to kind of farming.
FIELDS
2. Shape and size.
3. Nearness to farmstead.
TOPOGRAPHY
4. As affecting ease of cultivation.
5. As affecting production.
6. As affecting erosion and loss of fertility.
7. As affecting air drainage.
FERTILITY
8. Natural.
9. Condition.
PHYSICAL PROPERTIES OF THE SOIL
10. As affecting economy of cultivation.
11. As affecting number of days of labor.
12. As affecting loss of soil fertility.
13. As affecting kinds of possible crops.
DRAINAGE
14. Natural.
15. Artificial.
CONDITION
16. Freedom from stumps, stones, weeds, waste, etc.
CLIMATE
17. As affecting animal and crop production.
18. As affecting number of days of labor.
HEALTHFULNESS
19. As an economic factor.
LOCATION
20. Distance to market.
21. Roadways.
22. Local markets.
23. Shipping facilities.
24. Neighbors as an economic factor.
25. Labor supply of neighborhood.
26. R. F. D., telephone, trolleys, etc.
27. Churches, school, grange, etc., as economic factors.
TAXES
28. Per cent on cash value.
WATER SUPPLY
29. Running water, wells.
IMPROVEMENTS
30. Site of farmstead.
31. House as adapted to needs of farm.
32. Other buildings.
33. Fences; kind, condition, arrangement.
34. Timber, orchards, vineyards, etc.
INVESTMENT
35. Probability of an increase in value.
ACREAGE
36. Total acres.
37. Acres tillable.
38. Acres pasture not tillable
39. Acres woods.
40. Acres roads, waste, etc.
ESTIMATED TOTAL VALUE OF
41. Tillable area.
42. Pasture.
43. Woods.
44. Barns.
45. Houses.
Total.
PRICE ASKED

Types of Farming.— The chief factors that determine the type of farming in any region are: climate, soil, topography, transportation, distance to market or shipping point, market demand and supply, capital, labor, and insects, fungi or other pests. These factors do not often change suddenly. A new railroad may be built, and change the type of farming, or an insect pest may force a temporary change. Types of farming are in general stable, yet are nearly always gradually changing and sometimes are subject to sudden and radical change. The farmer must be conservative yet always ready to change when a change is necessary.

Crops are closely limited by climate, soil and topography. Animal production is also closely limited by these factors, for animal production depends on crops. Cattle and sheep are usually raised in regions where there is land that is good for pasture but not good for crops. If land is good for crops it is usually too valuable to be used for pasture. The length of the grazing season is also of great importance. This is not determined by the length of the warm period, but by the character and amount of grass.

The most important centres of production of products that are easily and cheaply shipped are in regions where the cost of production is least. Sheep can be raised in New York, in Montana, and in Australia. The most important centres of production are where the feed is cheapest, not where the product is used. Wool and mutton can be shipped long distances. Nor is the feed of a portion of the year the dominating factor; the feed cost for the entire year is the important matter. Butter is readily shipped and the centres of production are largely in the regions of cheapest production. But fresh small fruits, fresh vegetables and fresh milk are shipped with difficulty and at great expense, hence are usually produced near market. Hay is very bulky for shipment and is therefore usually produced nearer to market than the grains. It costs less to ship hogs than to ship the corn that a hog would eat. For this reason hogs are most abundant in the portion of the corn belt farthest from Chicago. A larger proportion of the corn near Chicago is shipped for manufacturing purposes.

Periods Over and Under Production.— No problem in farm management is more difficult than the problem of forecasting future needs. The farmer who foresees future shortages and raises products to meet them, is a public benefactor and at the same time makes a good profit for himself. The majority of mankind live in the present. If sheep or horses or apples are high, the majority are inclined to rush to these enterprises. But entering at the period of high prices does not mean selling on the high market; for the product comes years later when one must compete with all the others who rushed into the business at the time of high prices. The profit on a colt is not dependent on the prices of horses now, but on the prices of horses four to six years from now when the colt is sold. For every product there is a more or less definite cycle of over- and under-production. When a shortage of hogs occurs it takes two years to bring a surplus. In the meantime too many are likely to be raised so as to cause a surplus when they go on the market. When a shortage of horses is discovered there is usually a shortage of colts as well. Hence, it takes five to eight years to cause a surplus.

Violent changes in world affairs, such as the Great War, make violent fluctuations in demand for different products. These call for sudden modifications of agricultural practice and sometimes call for complete changes. At such times the changes that take place are likely to be much too great and are likely to result in serious underproduction of the articles that at first appear to be relatively abundant. As compared with peace, the war demands call for greatly increased amounts of clothing and for relatively large amounts of grain. Cotton, wool and grain rise in price more than food animals. The production of animals is at first relatively unprofitable. Later on, owing to the great decrease in animal production, the animals become highly profitable. Usually it pays a farmer to maintain his general type of farming, but make minor shifts to meet market demands.

The Relation of Capital to Type of Farming.— Most farmers begin business with a small capital and gradually increase as they save money. With small capital one must economize on the less essential things. Usually land, horses and machinery are the essentials, so that the man with small capital is likely to have fewer producing livestock and sell more crops than he will when his capital increases. As capital increases, not only does he increase the number of livestock but he improves their quality.

Type of Farming and Labor.— In nearly every region there are one or two crops or classes of animals that are much more profitable than others. Usually it pays a farmer to use his available labor and equipment to produce the maximum amount of these products. But other crops can be grown at periods when the most profitable crop does not demand attention. It therefore pays to fill in the time with these less profitable enterprises. In the South, the custom is to grow all the cotton that can be handled, but it pays to fill out with less profitable crops so that one has a diversified farm. In the corn belt the maximum area of corn is grown, but it pays to fill out the season with oats, hay and other less profitable enterprises so as to provide a full year's work.

Intensity of Stocking.— In order to compare farms as to the livestock enterprises, it is necessary to reduce all animals to a comparable unit. One horse or cow is called an animal unit. Seven sheep, five hogs, or 100 hens are each called an animal unit. In each case twice as many young stock are required. In some of the most intensive dairy regions there are less than two acres of harvested crops per animal unit. In some parts of the wheat regions of the Northwest there are as high as 13 acres of crops per animal unit. In the cotton belt six acres is very common. In most parts of the United States the number is from two to seven acres of crops per animal unit. Regions that have three acres or less of crops per animal unit may be said to be heavily stocked, regions with four or more acres of crops are lightly stocked.

An animal unit produces about one ton of manure per month. If the animals are in the barn half of the time, six tons of manure will be available per animal unit. In many parts of the North as high as eight tons are commonly recovered for use on crop land. In the South the animals are in the barn so little that only a small amount of manure is recovered. If six tons are recovered per animal unit, and if there are three acres of crops per animal unit, then there will be two tons of manure for each acre of crops each year. An application of 10 tons per acre could therefore be made every five years. Similarly, if there are six acres per animal unit only 10 tons per acre could be applied every 10 years. Under this condition many parts of the farm are likely not to be manured at all.

When manure is spread by hand it is usually applied at the rate of 15 to 30 tons per acre. It is therefore evident that only on the most heavily stocked farms will the entire farm receive manure. But with a manure spreader, and by making applications of 5 to 10 tons, the entire farm can be regularly manured in most regions of the North and east of the arid region.

Timeliness in Work.— Probably no other industry calls for such frequent changes in plans. The problem of timeliness is, therefore, much more difficult than in most industries. A farmer may plan to harvest crops, but a rain comes up and he changes to inside work. The storm seems to be over and he starts out to fix a road, but the rain comes on again and promises to be a rainy day. He then gives up and goes to town to get machinery repaired and do trading.

Some farm operations, such as driving fence posts, require that the soil be very wet to work to the best advantage. Other operations, like plowing, require that it be moist but not wet. Plowing can be done when it is too wet to cultivate, harrow, or plant. Other operations, such as harvesting, require dry weather. In most regions the greatest problem is to get the dry weather work done. The different fields also differ in their characteristics. One must plow and plant the fields when he has a chance. The best drained land can be used for the times when the wet land cannot be worked. The decision as to when to be doing a particular piece of work is of great importance. The morning may start out wet and one may start doing one of the wet weather jobs but it may clear suddenly and demand a change before noon.

Not only is the problem of quick decisions and frequent changes of plans important, but it is often necessary to do two days' work in one. If land is fitted for seeding and a rain comes it must be fitted again. If by working as long as one can see the field can be planted, it will save perhaps twice the time later and will avoid the danger of not getting the crop in on time. The rushes of work can be taken care of by a family in a way that is impossible on a very large farm. The farmer, being interested, does not complain about working a long day. He can do less work or easier work on a less important day and so rest up. His wife and children also help, particularly on the days of great pressure, so that there is a reserve supply of energy to meet the critical periods. When there are only one or two hired men working with the farmer he can often arouse in his men the same spirit for extra work at the essential time.

Size of Farm.— The constant vigilance that is required makes it impossible to supervise agricultural operations by the factory method. The one who makes the decision must be «on the job» all the time.

On the other hand, one man is at a very great disadvantage on a farm. Many operations require two men. On a one-man farm, if the farmer goes to town, or does chores or other hand labor, the horses are all idle. Some farm operations require four horses, others call for only two horses. Or if he keeps only two men he cannot take advantage of the work that can be done with four. With two men it is possible to so arrange the work as to make much more efficient use of horses. The most efficient farms usually provide work for two or three persons,— a farm that can be run by a farmer and his sons, or by a farmer and one or two hired men. Farms of this size produce food at the lowest cost. The strictly one-man farm or the very large farm find difficulty in competing with the two-man farms. Another reason for the failure of large scale farming is that the distances from the barn to the fields are too great with large farms. Those who attempt to operate large tracts of land are nearly always forced to some sort of a tenant system. By giving the operator a share of the product he becomes personally interested in the success of his operations and his family labor that might not be hired is all available for helping in the work.

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FARM MORTGAGE BANKERS ASSOCIATION. See Banks and Banking; Bankers Associations in the United States.

FARM POWER. Aside from the labor of man and the domestic animals on the farm, the sources of power available to the farmer are the natural forces of wind and falling water, and the mechanical power generated by engines through the combustion of some kind of fuel. The power afforded by the windmill, although the cheapest to install and maintain, is uncertain and comparatively feeble, and it has been employed only to a limited extent. It has the serious disadvantage of not being portable power, and has to be used where it is located. In some few cases the power of windmills has been converted into electricity and thus distributed about the farm. The various types of farm water-wheels develop a larger and more dependable power than windmills, but labor under the same disadvantage in point of portability. The cheap, portable, reliable farm power of the present day is the gasoline or kerosene motor. The steam engine is also available but is of much heavier and more complex construction, more expensive to buy and requiring more skill to maintain. As to cost of operation, the steam engine is undoubtedly the cheapest where there is wood on the farm. The cost of running it is about one-sixth that of doing the same work with horses. Gasoline and oil motors are but little more expensive than steam machinery, and consequently are much more in favor.

Gasoline engines for farm use are made in two distinct types: stationary and tractor. The former can be used for many kinds of work which can conveniently be brought to the engines — such as churning, pumping of water, corn shelling, feed cutting, threshing, etc.; the tractor engine is for work which cannot be brought to the power — where the engine must go to the work — such as plowing and harrowing, seeding, mowing and reaping and harvesting. The stationary types are adapted to several different kinds of fuel, burning indifferently kerosene, distillate or alcohol, as well as gasoline. The tractor engines are comparatively heavy, ranging from 6,000 pounds upward. A tractor of that weight will do the same amount of hauling as 12 horses, and do it continuously, without requiring time for rest. Heavier machines of 10,000 pounds will exert tractive power equal to 25 to 30 horses. These tractors are geared down to slow speeds of one and three-quarter to two miles per hour for use in plowing, which cannot be done faster. They burn gasoline as a rule. For farms within reach of an electric power plant there is the portable electric motor which is serviceable in a multitude of farm operations, even to doing the milking. (See Farm Machinery; Hydraulic Ram; Water-wheel; Windmill). Consult Eighinger, S. R., and Hutton, M. S., 'Steam Traction Engineering' (New York 1916); Hirshfield, C. F., and Ulbricht, T. C., 'Farm Gas Engines' (New York 1913); Page, V. W., 'The Modern Gas Tractor' (New York 1913); Potter, A. A., 'Farm Motors' (New York 1917); Shane, A., 'Electric Power on the Farm' (New York 1915); Stephenson, J. H., 'Traction Farming and Traction Engineering' and 'Farm Engines and How to Run Them' (Chicago 1913).

FARM TENANCY. See Farm and Farm Problems.

FARM TYPES AND TENDENCIES. See Farm and Farm Problems; Farm Management.

FARMAN, Elbert Eli, American jurist: b. New Haven, Oswego County, N. Y., 23 April 1831; d. 1911. He was graduated at Amherst College in 1855, and admitted to the bar in 1858 and to the United States courts in 1862. He studied international law in Berlin and Heidelberg, Germany, in 1864–67; was district attorney of Wyoming County, N. Y., in 1868–75; United States diplomatic agent and consul-general at Cairo, Egypt, in 1876–81; was a member of the International Commission to revise the judicial codes of Egypt, in 1880–81; judge of the mixed tribunal of Egypt in 1881–84; and United States member of the International Commission which examined the claims of the inhabitants of Alexandria for losses arising from the bombardment in 1882, 1883 and 1884. He secured the obelisk "Cleopatra's Needle" as a gift of the khedive to New York, in 1879; made large collections of ancient coins and Egyptian antiquities which he gave to the Metropolitan Museum of Art in New York. His publications include 'Along the Nile with General Grant' (1904); and 'Egypt and Its Betrayal' (1908).

FARMAN, Ella. See Pratt, Ella Farman.

FARMAN, fär'moñ, **Henri,** French aeroplane builder: b. May 1875. He began life as a painter at the École des Beaux-Arts, and then became a cyclist, and was champion several times. He then ran for Panhard cars and won the Paris-Vienna and several local races. He next opened a business in motor cars and is owner of the largest garage in Paris, called Palais de l'Automobile. Having enough of selling cars he turned his attention to flying, which had long been in his mind. His first trials were made at Issy les Moulineaux in November 1907, and January 1908. He won the Prix Deutsch Archdeacon of 50,000 francs for the first "kilomètre bouclé"; then traveled in Europe with his machine; flew to a height of 20 mètres; won all the prizes at that time, including the Grand Prix de Rheims at the first official meeting. He continued his study of new models and made the first cross-country flight with his machine from Buoy to Rheims, alone and with passenger. He was the first man to fly in New York. He opened important works at Billancourt for the supply of machines to the French army and also other countries, including England.

FARMER, Henry Tudor, American poet: b. England 1782; d. Charleston, S. C., January 1828. While very young he emigrated to Charleston, S. C., where he continued to reside till his death. He published a small volume of poems entitled ‘Imagination, the Maniac's Dream, and Other Poems’ (1819); also an ‘Essay on Taste.’

FARMER, Hugh, an English clergyman and theologian: b. near Shrewsbury, 20 Jan. 1714; d. Walthamstow, Essex, 5 Feb. 1787. He studied in the academy conducted by Philip Doddridge 1731–36. In 1737 he began to serve as chaplain for Mr. Coward and also was pastor of the dissenting congregation at Walthamstow and continued in charge until 1780. In 1761 he removed to London where he was afternoon preacher at Salter Hall (1761–72) and one of the preachers of the Merchants' lecture, 1762–80. He was a trustee of Dr. Williams Foundation and of the Coward Trust. His works are ‘An Inquiry with the Nature and Design of Christ's Temptation in the Wilderness’ (1761; 5th ed., 1822); ‘A Dissertation on Miracles’ (1771); ‘An Examination of Mr. Le Moine's Treatise on Miracles’ (1772); ‘An Essay on the Demoniacs of the New Testament’ (1775); ‘The General Prevalence of the Worship of Human Species in the Ancient and Heathen Nations Asserted and Proved’ (1783). His life was written by Michael Dodson (1805).

FARMER, John, American genealogist: b. Chelmsford, Mass., 12 June 1789; d. Concord, N. H., 13 Aug. 1838. He published in 1829 a much valued ‘Genealogical Register of the First Settlers of New England.’

FARMER, John Bretland, English botanist: b. Atherstone, 5 April 1865. He was educated at Magdalen College, Oxford. From 1887 to 1892 he was demonstrator of botany at the University of Oxford and Fellow of Magdalen College from 1889 to 1897. From 1892 to 1895 he was assistant professor of biology. In the latter year he became professor of botany at the Imperial College of Science and Technology, London. He has published ‘A Practical Introduction to the Study of Botany’; ‘Plant Life,’ also a number of memoirs, chiefly botanical and cytological. He edited the *Annals of Botany* and ‘The Book of Nature Study’ (6 vols.). With A. D. Darbishire he translated and edited De Vries, ‘Die Mutationstheorie.’

FARMER, Moses Gerrish, American electrician: b. Boscawen, N. H., 9 Feb. 1820; d. Chicago, Ill., 25 May 1893. He was graduated at Dartmouth College in 1844. He invented several electro-motors, one of which he used in his workshop to drive a lathe, and another on a miniature railway. On this railway he transported by electricity the first passengers ever so carried in the United States. In 1847 he moved to Framingham, Mass., and invented the telegraph fire alarm. His was the first house to be lighted (1858–59) by electricity. In 1865 he invented a thermo-electric battery and also built the first dynamo, and in 1880 patented an automatic electric light system. Besides these inventions he brought to light and perfected many others of general utility.

FARMER, Richard, English Shakespearian scholar: b. Leicester, 28 Aug. 1735; d. Cambridge, England, 8 Sept. 1797. In 1767 he published his ‘Essay on the Learning of Shakespeare,’ which passed through several subsequent editions. In it he showed that Shakespeare's knowledge of classical subjects was entirely obtained through translations, which he often followed very closely. He was appointed master of Emmanuel College, Cambridge, in 1775, and was a prebendary of Canterbury 1782–88, when he was appointed to a residentiary prebend in Saint Paul's, London.

FARMERS, Retired. See Farm and Farm Problems.

FARMERS' ALLIANCE, a national organization for improving agricultural conditions, advancing social life, securing favorable legislation, etc.; at first non-political, then political, then non-political again. Originating as a State body in Texas about 1876, it coalesced in 1887 with similar State bodies into a national one; and in 1889 joined the Knights of Labor in a common political party called the National Farmers' Alliance and Industrial Union, with a platform demanding more greenbacks, unlimited free coinage of silver, no national banks, anti-speculation laws and government ownership of all transportation lines. The southern branch added a demand for government loans at low rates, and sub-treasuries to buy and store farm products. In the West in 1890 the party put up its own candidates; in the South it adopted and dictated the Democratic; it carried the Kansas and Nebraska legislatures, held the balance in Illinois, Minnesota and South Dakota, and elected nine national representatives, and one senator each from South Carolina (nominally Democrat), Kansas and South Dakota. In 1892 it fused with others and called itself the People's Party (q.v.), and nominated for President James B. Weaver, who received 1,041,021 votes; but the southern branch declined to change its political affiliations, and seceded, the Alliance proper going out of politics again. The Farmers Alliance, uniting with several other similar organizations, formed the Farmers' National Congress in 1914, which claimed to represent a membership of over 3,000,000 farmers. The congress advocated Federal aid for inland communications; proper protection for co-operative enterprises; the illiteracy test for immigrants and the placing of a poll tax upon them. It opposed ship subsidies and interstate liquor traffic in dry territory.

FARMER'S ALLMINAX, The, a parody of the *Farmers' Almanac* issued annually from 1869 to 1880 by Josh Billings. It was very popular, the sales mounting to the hundreds of thousands.

FARMERS' CO-OPERATIVE MOVEMENT, a world-wide phase of propaganda actively carried on in agricultural districts to secure efficient co-ordination and co-operation among farmers, so that the best results may be obtained in the harvesting of crops and food supplies. In the United States the movement is fostered by the State Department of Agriculture and the National Association of State Commissioners of Agriculture, and is aggressively carried on through various agencies. See AGRICULTURAL ASSOCIATIONS; CO-OPERATION; FARMERS' ALLIANCE; FARMERS' INSTITUTES; FARMERS' NATIONAL CONGRESS; INTERNATIONAL INSTITUTE OF AGRICULTURE.

FARMERS-GENERAL, a privileged association in pre-Revolutionary France, who leased the public revenue of the country. The system originated in the 14th century when the tax on salt was farmed out in order to raise money for the war with England. Thereafter other taxes were so leased or farmed and in 1720 a board of administration was formed with one of the farmers-general as president. The Minister of Finance had the power to select the farmers-general but the system led to the most corrupt practices, court favorites being often given a tax instead of a pension. Just previous to the Revolution the body of farmers-general numbered about 60. They turned in a fixed amount to the treasury and all tax returns above this fixed amount went into their own pockets. The system was abolished by the constitution of 1791 and during the Revolution many of the ex-farmers-general were sentenced to the guillotine. The system was one of the principal causes of the Revolution, the farmers-general not being noted for their leniency in exacting the imports from the tax-paying public. Consult De Nervo, 'Les finances françaises sous l'ancienne monarchie' (Paris 1863); Lowell, 'The Eve of the French Revolution' (Boston 1892); Gomel, C., 'Les causes financières de la révolution française' (2 vols., Paris 1893).

FARMERS' INSTITUTES, gatherings of farmers held annually in the various States, sometimes under the direct management of the agricultural colleges and sometimes controlled by other State officers. The object of these institutes is in great part the bringing together of the workers in agricultural science and the practical farmers, for the discussion of questions of mutual interest. The latest agricultural theories are presented and discussed and compared with the result of practical tests and long experience. They grew out of the public meetings held years ago under the auspices of the local State agricultural fairs throughout the United States; and they stand for improvement in business and home life. Just as the agricultural fairs were carried on in different ways in different localities so the institute is free in its general manner of procedure; but it is marked by characteristics common to all assemblies and localities. In some places the institutes meet for a half or a whole day once a month; in others they are held once or twice a year and last several days. Their activities are more pronounced in the winter when the farmers have more leisure time. The development of farmers' institutes has been chiefly due to the impetus given to the agricultural interests of the country by the Morrill Land Grant Act of 1862. These gatherings are held regularly in all the States and in all the provinces of Canada. In 1899 over 2,000 institutes were held in this country, and the special appropriations for this purpose aggregated over $140,000, not including $30,000 funds estimated as expended from other sources. In 1913 the funds of the various States had risen to $510,784.

In all the provinces of Canada, as in all the States of the Union, the institutes are regularly organized with officers possessed of both practical and technical knowledge to direct them. Very frequently they meet under the auspices of the State Agricultural College in this country and under that of the province in Canada. In the beginning of their history they made the mistake of going into politics, and they suffered for it; but since they have decided to tend strictly to the business for which they were organized, they have made great advancement.

The institute forms a clearing-house for the exchange of ideas, of experiences and of acquired knowledge; and not the least valuable members are the graduates of agricultural colleges, the practical teachers of the same, and the modern progressive, scientific farmer. The agricultural experimental stations contribute valuable help, also, to the meetings in the assistance which they lend to the organizers and promoters thereof. One of the most valuable features of the institute is the popular lecture, which is generally held in the evening, after the more technical work of the day's session. Movable schools also furnish the farmers, their sons, daughters and wives with valuable instruction in subjects relating to the conducting of all matters pertaining to the farm. The Department of Agriculture of the United States has contributed to the improvement of the agriculture of the country by collecting publications and placing them at the disposal of the farmer. It has also organized lecture courses in agricultural subjects, which it furnishes to institutes and lecturers, free of charge. These lectures are generally well illustrated with lantern slides.

In 1913 there were 7,926 regular institutes held in the United States; and these occupied in all 10,578 days. In addition to these there were 800 independent institutes. The total attendance at these institutes was over 4,000,000. But this is only a part of the work done by them for they maintained 187 movable schools, which pretty well covered the country in conjunction with 25 educational trains. From 1903 to 1913 the attendance at the sessions of the institutes increased over 300 per cent while the increase of the appropriations was 175 per cent during the same period.

Bibliography.— Hamilton, 'Legislation Relating to Farmers' Institutes' (Bulletin 241); 'Farmers' Institutes and Agricultural Work in the United States' (Bulletin 83); 'History of Farmers' Institutes in the United States' (Bulletin 174); all of which may be had from the office of the Experimental Stations, United States Department of Agriculture.

FARMER'S LETTERS, a series of political tracts, in which was denounced the British policy of taxing the North American colonies without representation or consent. The letters, 12 in number, were published in 1767 and were ostensibly written by a farmer. Later they were traced to a citizen of Pennsylvania, John Dickinson. The letters had a tremendous influence in educating and forming public opinion on the burning issues of the day.

FARMERS' NATIONAL CONGRESS, an organization having for its object the advancement of the agricultural interests of the

Union, and composed of the same number of delegates from each State (or Territory) as the latter is entitled to in its representation in the United States Congress. The delegates are appointed by the governors of their respective States or by some other State official. All heads of State bureaus of agriculture are considered members, and one representative from each agricultural college. In 1916 it represented over 3,000,000 farmers. It urged Federal aid for inland communications, a head tax and illiteracy test for immigration, protection for co-operative enterprises, and opposed ship subsidies, free distribution of seed and interstate liquor traffic into dry territory. Consult Woodburn, 'Political Parties' (2d ed., New York 1914).

FARMHOUSE, The. See LA BARRACA.

FARMING. See AGRICULTURE; AGRICULTURAL CHEMISTRY; AMERICAN FARM IMPLEMENTS; DAIRY INDUSTRY; CATTLE; FARM MANAGEMENT; FARM POWER; FARMS AND FARM PROBLEMS; FARMERS' INSTITUTES, etc.

FARMINGTON, Conn., borough of Hartford County, eight miles west of Hartford, on the New York, New Haven and Hartford Railroad. It is the seat of Sarah Porter's Seminary for Young Ladies. Farming and fruit-growing are the principal interests of the borough. Pop. 3,478.

FARMINGTON, Me., town, county-seat of Franklin County, on the Sandy River and the Maine Central and Sandy River railroads, 30 miles northwest of Augusta, on a direct route from the south to Rangeley lakes. It is a business and educational centre, and has several banks, hotels, a courthouse, a weekly paper and some manufactories. The town includes several villages, of which Farmington Village (incorporated) is chief. Farmington Academy (1807) was succeeded in 1863 by a State normal school, which has graduated over 1,300 teachers. The Abbott Family School for Boys (1844) opened in 1903 with new buildings. Cutler Memorial Library (1903) is a model granite building. Here for years lived the author Jacob Abbott (q.v.); John S. C. Abbott (q.v.), was once a pastor here; and Lillian Norton (Mme. Zoltan Döme), the prima donna, known as Madame Nordica was born here. Among the industrial establishments are machine shops, lumber and grist mills, wood-turning shops, carriage works and canning factories. The waterworks are municipally owned. Pop. 3,310.

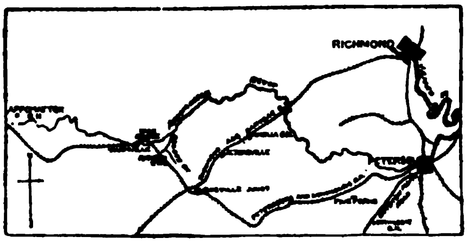
FARMINGTON, Mo., city and county-seat of Saint François County, 58 miles southwest of Saint Louis, on the Saint Louis, Iron Mountain and Southern and the Cape Girardeau Northern railroads. It is the seat of Carleton College (Methodist Episcopal) and Elmwood Seminary for Girls. A State insane asylum is situated here. It is the centre of a productive lead-mining region and has carriage and wagon works, lumber mills, machine shops, flouring mills, etc. It has three banks with $1,500 000 in resources and the assessed valuation is $1,400,000. The waterworks and electric-light plant are owned by the city. Pop. 3,000.

FARMS, Abandoned. See FARM AND FARM PROBLEMS.

FARMS, Co-operative. See FARM AND FARM PROBLEMS.

FARMVILLE, Va., town, county-seat of Prince Edward County, about 40 miles southeast of Lynchburg, on the Appomattox River and the Norfolk and Western Railroad. Here is the State Female Normal School. In the vicinity is the Hampden Sidney College for Young Men. Farmville is in a fertile agricultural region, is an important tobacco-manufacturing centre and has medicinal springs. There are plow-handle and overall factories and a creamery. The waterworks and electric-light plant are owned by the town. Pop. 2,971.

FARMVILLE AND HIGH BRIDGE, Engagements at (and THE SURRENDER OF THE ARMY OF NORTHERN VIRGINIA AT APPOMATTOX COURT-HOUSE). Farmville, on the south bank of the Appomattox, 70 miles southwest of Richmond, is noted as the place where General Grant opened his correspondence with General Lee which led to the surrender at Appomattox. After the battle of Five Forks (1 April 1865) and the successful assault on the Petersburg lines (2 April), Lee retreated and Grant pursued. Sheridan, with his cavalry and the Fifth corps, 3 April, pushed for the Danville Railroad, keeping south of the Appomattox, followed by the Second and Sixth corps in the direction of Amelia Court-house, while General Ord with the Twenty-fourth corps and a division of the Twenty-fifth, moved along the Southside Railroad for Burkesville. On 4 April Sheridan struck the Danville road near Jetersville and learned that Lee was at Amelia Court-house, eight miles northeast. He immediately entrenched the Fifth corps and awaited the arrival of General Meade with the Second and Sixth corps. Meade found the roads so obstructed with Sheridan's cavalry that he did not get up until the afternoon of 5 April. Ord reached Burkesville on the evening of the 5th. He had been directed by Grant to cut the bridges in Lee's front, to intercept his movements toward Danville and Lynchburg, and await orders at Burkesville. To cut the High Bridge, four miles east of Farmville, Ord, before daybreak of the 6th, sent two small infantry regiments (54th Pennsylvania and 123d Ohio), and 80 officers and men of the 4th Massachusetts cavalry, all under command of Col. Francis Washburn, with orders to push rapidly for the bridge and burn it. After Washburn had gone, Ord sent Gen. Theodore Read, his chief-of-staff, with a small party to overtake him and reconnoitre well before moving up to the bridge. Soon after Read had gone, Ord received a dispatch from Sheridan that Lee was moving west of Jetersville and making apparently for Burkesville, upon which he put his command in position



to meet him and sent an officer to caution Read that Lee's army was in his rear and that he must return by pressing on, crossing the Appomattox, and going around by Prince Edward Court-house. This last officer was driven back by Lee's cavalry. Read overtook Washburn, took the cavalry into Farmville, examined the country, returned to the infantry and pushing on, was within two miles of High Bridge, when about noon, he ran into Lee's advance, Rosser's and Munford's divisions of cavalry. Read and Washburn drew up the little band of cavalry and 500 infantry and began one of the most gallant fights of the Civil War. Again and again they led the cavalry in successive charges. Read and Washburn fell mortally wounded, and at last not an officer of the cavalry remained alive or unwounded, to lead the men, and the entire command, cavalry and infantry, was enveloped and surrendered.

At 6 A.M. 6 April, the Second, Fifth and Sixth corps moved from Jetersville up the line of the Danville road toward Amelia Court-house, where it was hoped to intercept Lee, but during the night Lee had moved west, and when this was discovered, after a march of four miles, the advance on Amelia Court-house was suspended and the three corps marched westward parallel to Lee's line of retreat and endeavoring to head him off or bring him to a stand. The Second corps came up to Gordon's corps at Flat Creek and was for a time checked but, fording the creek, drove Gordon off and followed him to Sailor's Creek, where he made a stand, but was again driven with a loss of 13 colors, three guns, several hundred prisoners and more than 200 wagons. During the day the Second corps had taken about 1,700 prisoners, four guns and more than 300 wagons and ambulances. Its loss was about 400 men. While the Second corps was thus engaged, the Sixth corps on its left, with the cavalry divisions of Crook and Merritt, had overtaken and attacked the commands of Ewell and Anderson on Sailor's Creek, routed them with a severe loss in killed and wounded, and took many thousand prisoners, among them six general officers, including General Ewell. The Confederates continued their retreat. Longstreet with the divisions of Field, Heth and Wilcox marched to Farmville, crossed to the north bank of the Appomattox and, on the morning of the 7th, began to move out on the road passing through Appomattox Court-house to Lynchburg. Fitz Hugh Lee with all his cavalry followed Longstreet. General Gordon with the other half of Lee's army, crossed at High Bridge. On the morning of the 7th the Union army continued the pursuit, the cavalry, with the exception of one division, and the Fifth corps moving by Prince Edward Court-house; Ord, with his command, the Sixth corps and Crook's cavalry division on Farmville; the Second corps by the High Bridge road. With great difficulty Crook's cavalry waded the river above Farmville, and Gregg's brigade in moving out was fiercely assailed by Fitzhugh Lee and driven back across the river, Gregg and many of his men being captured. Meanwhile, Ord and the Sixth Corps had come up to find the bridges destroyed, the water too deep for fording and Lee's army in plain view on the opposite bank, drawn up for battle. The Second corps, pursuing Gordon, came to High Bridge just as Gordon's corps and Mahone's division had crossed and set fire to it and the wagon road bridge below it. Barlow, whose division was in advance, threw forward his head of column, which seized the wagon road bridge, extinguished the fire and moved across, Mahone's division after some sharp skirmishing, retiring in a northwest direction, Gordon's corps moving along the railroad toward Farmville. Barlow followed Gordon, while Humphreys led Miles' and De Trobriand's divisions after Mahone and at 1 P.M. came up to Lee's army in an entrenched position, its left four miles from Farmville, on the crest of a long slope of open ground, covering the roads to Lynchburg. Poague's 16 guns opened on him, he threw forward skirmishers, and an unsuccessful attempt was made to take the position in flank. Barlow was sent for but did not get up until sunset. Meanwhile Miles saw an opening and attacked with part of a brigade and was repulsed with considerable loss. Barlow, who had followed Gordon, attacked him and succeeded in cutting off a large train of wagons, which he destroyed, and then rejoined his corps, which bivouacked within 100 yards of Lee's position. The loss of the Second corps during the day was 571, and it had captured 19 guns, many wagons, and had held Lee from continuing his retreat, until such time as Sheridan and Ord were fast gaining his line of escape.

At 5 P.M. General Grant, from his headquarters at Farmville, wrote General Lee asking the surrender of his army. This was sent through the Second corps lines at half past 8, and within an hour Lee replied, asking the terms that would be offered on condition of his surrender. During the night Lee retreated, Gordon leading and Longstreet bringing up the rear. The Second and Sixth corps followed Longstreet closely, and Sheridan, with his cavalry, followed by the Fifth corps and Ord's command, marched on the south side of the Appomattox, captured at Appomattox Station four trains of cars loaded with supplies for Lee's army, 25 guns, and a large park of wagons, and drove Lee's advance forces back to Appomattox Court-house. On the morning of 9 April Sheridan advanced but his cavalry was being pushed back just as Ord, who had marched all night, had formed in his rear, and the Army of Northern Virginia had made its last effort. Sheridan and Ord were in its front; the Second and Sixth corps were close on its rear, negotiations were in progress, hostilities were suspended and about 3 o'clock in the afternoon, 9 April, the terms of surrender were agreed upon and the War of the Rebellion was practically ended.

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E. A. CARMAN.

FARNABY, or FARNABIE, Thomas, English educator and editor of classic texts: b. London, about 1575; d. Sevenoaks, 12 June 1647. He was educated at Merton College, Oxford, was converted to the Catholic faith, and attended a Jesuit college in Spain. He accompanied Drake and Hawkins on their last voyage, saw some military service in the Netherlands and is next found teaching in a grammar school at Martock, Somersetshire. Achieving a large measure of success there he removed to London and opened a school at Goldsmith's Rents, Cripplegate. This school was most successful, being attended by as many as 300 pupils, among whom were many from aristocratic families and many who rose to eminence in church and state. He bought an estate at Oxford, near Sevenoaks, Kent, and during the great plague of 1636 moved his school thither. In 1643, being suspected of participation in a royalist uprising, he was imprisoned. Farnaby's works consisted of annotated editions of Latin authors — Juvenal, Martial, Lucan, Ovid, Persius, Seneca, Terence, etc. In 1641 appeared his 'Systema grammaticum,' a Latin grammar which was written at the request of Charles I and intended to supersede those previously in use in the public schools.

FARNAM, Henry Walcott, American political economist: b. New Haven, Conn., 6 Nov. 1853. He was graduated at Yale in 1874 and studied also at the universities of Berlin, Göttingen and Strassburg, receiving the degree of R.P.D. (Rerum Politicarum Doctor) in 1878. In 1878–80 he was tutor at Yale and since 1880 has occupied the chair of political economy there. From 1881 to 1903 he occupied a similar chair at the Sheffield Scientific School. In 1914–15 he was nominated Roosevelt professor in Berlin, but was prevented by the war from going to Germany. From 1892 to 1911 he was on the editorial staff of the *Yale Review* and of the *Economic Review* from 1911 to 1912. In 1898–99 he served as chairman of the New Haven civil service board, and from 1887 to 1909 of the State Commission of Sculpture. Since 1901 he has served as president of the Connecticut Civil Service Reform Association. He published 'Die innere Französische Gewerbepolitik von Colbert bis Turgot' (1878); 'Die Amerikanischen Gewerkvereine' (1879); 'Memoir of Henry Farnam' (1899); 'Deutsch-Amerikanische Beziehungen in der Volkwirtschaftslehre' (in Schmoller *Festgabe* 1908); chapters on government insurance and workingmen's insurance in Germany in 'Yale Readings in Insurance' (1909); 'The Economic Utilization of History' (1913), articles and addresses, mainly on economic subjects.

FARNBOROUGH, England, an urban district of Hampshire, 33 miles southwest of London, on the London and Southwestern and the Southeastern and Chatham railways: Saint Michael's Catholic memorial Church was erected here in 1887 by the ex-Empress Eugénie and contains the tombs of Napoleon III and the Prince Imperial. The town is also the seat of a French Benedictine convent and is noted for its strawberry gardens, which supply the London markets. Aldershot North Camp is within the parochial limits of Farnborough. The town contains a large government aircraft factory. Pop. about 6,000, exclusive of the military.

FARNE, fārn, or **FERNE ISLANDS,** or **THE STAPLES,** a group of islands in the North Sea, off the coast of Northumberland, England, some of them invisible except at low tide. Saint Cuthbert lived for nine years on the largest island of the group (Farne or House) and died here (687); ruins of the old abbey of which he was prior, of the ancient chapel and of a peal tower still exist. These islands have been the scene of several disastrous shipwrecks, one of which, that of the Forfarshire steamer (1838), occasioned a display of remarkable heroism by Grace Darling, daughter of the keeper of the lighthouse on Longstone. Another steamer, the *Pegasus,* going from Leith to Hull, was lost here in 1843 and 60 individuals perished. There are two lighthouses on the islands.

FARNELL, Lewis Richard, English archæologist: b. Salisbury, 19 Jan. 1856. He was educated at the City of London School and of Exeter College, Oxford. He became Fellow of the latter institution in 1880, went to the universities of Berlin and Munich to study classical archæology and visited most of the museums of Europe on the same quest. He traveled in Greece and Asia Minor. In 1883 he was appointed classical lecturer and in 1884 sub-rector of Exeter College, later becoming university lecturer in classical archæology. In 1893 he became senior tutor of Exeter and in 1894 proctor of the university. In 1909 he was elected the first Wilde lecturer in comparative religion and in 1911 became Hibbert lecturer. He is rector of Exeter College. His publications include 'An Englishman's Adventures on German Rivers'; 'Cults of the Greek States' (5 vols., 1896–1909); 'Evolution of Religion' (1905); 'The Higher Aspects of Greek Religion' (1907); 'Greece and Babylon' (1911), and various articles on Greek archæology, religion and philology in various journals, English and foreign.

FARNESE, the name of a princely family of Italy, whose origin dates from the middle of the 13th century. At that time it possessed the castle of Farneto, near Orvieto. Pope Paul III (Alessandro Farnese) instituted the duchy of Parma and Piacenza in favor of his natural son, Peter Louis Farnese, whom he had begotten previous to his entry into holy orders. From 1545 to 1731 the Farnese were the sovereign dukes of Parma. The most celebrated members of this house were Pietro Luigi, natural son of Paul III, b. 1503; assassinated 1547. He built a citadel at Piacenza and ruled with great severity over his subjects. Despised and hated by the latter for his despotism and debauchery he was assassinated and Piacenza was handed over to Ferdinand de Gonzaga, the governor of Milan, by appointment of Charles V. Farnese, Octavius, son of the preceding: b. 1520; d. 1586. After his father's death he managed to retain hold of Parma but was unable to recover Piacenza at first until he received aid from Pope Julius III. He married Margaret of Austria, natural daughter of Charles V. His son, Alessandro Farnese, b. Rome, 1545; d. near Arras, 1592, followed his mother to Brussels, when she was made regent of the Netherlands. In 1571 he distinguished himself at the battle of Lepanto and a few years later on the death of Don Juan of Austria became governor of the Spanish Netherlands, where he was successful in re-establishing the authority of the King of Spain throughout the Southern provinces, by taking Brabant, Maastricht, Malines, Bois-le-Duc and Tournai. He was less successful in the North because of the support given Holland and Zealand by Elizabeth of England. Called to France to help the Catholic cause he compelled Henry IV to raise the sieges of Paris and of Rouen. He died from the effects of a wound received before Caudebec. His son and successor, Ranuccio, b. 1569; d. 1622, was a despot who alienated the support of the nobility. He cast his natural son, Ottavio, into prison where he perished miserably. Despite his cruelty he was a scholar and artist and embellished Parma with many monuments. He married Margaret Aldobrandini, grandniece of Pope Clement VIII. He was succeeded by his second son, Odvardo, b. 1612; d. 1646, a prince remarkable for the elegance of his manners and his fastidiousness in dress. His son, Ranuccio II, b. 1630; d. 1694, succeeded him in the duchy. Francis, son of Ranuccio II, b. 1678; d. 1727, during the War of the Spanish Succession, placed himself under the protection of the church, but despite this, the Imperial forces several times violated his territory. Since Francis had no children, it was agreed in 1720 between England, France, Austria and Spain, that the heritage of the Farnese house should pass to the eldest son of Elizabeth Farnese, consort of Philip V of Spain. With the death of Antonis, brother of Francis, in 1731, the male line became extinct and the succession passed into the hands of the Infanta Don Carlos. Consult Gregorovius ‘History of Rome’ (London 1900); Scarabelli, ‘Storia civile dei ducati di Parma’ (Piacenza 1858); Pezzano ‘Storia della città di Parma’ (Parma 1859).

FARNESE, Alessandro (Duke of Parma), ā-les-sän'drō fär-nā'sē, Italian general: b. Rome 1545; d. Arras, France, 3 Dec. 1592. He served his first campaign under Don John of Austria, and distinguished himself in the battle of Lepanto in 1571. In 1577 Philip II ordered him to lead back the Spanish troops, which Don John had been obliged to dismiss from Flanders; and Don John dying that year, Alessandro was made governor of the Spanish Netherlands. He recovered Maestricht and several other cities, and succeeded in reconciling the Catholic part of the insurgents to the Spanish government. The Protestants, however, formed the Union of Utrecht (1579), and called in the Duke of Anjou, a brother of Henry III of France, to defend them. He appeared at the head of an army of 25,000 men; but Alessandro was constantly successful, capturing Antwerp (1585), compelling Henry IV to raise the siege of Paris (1590), and relieving Rouen (1591).

FARNESE, Alessandro. See Paul III, Pope.

FARNESE, Elizabeth. See Elizabeth Farnese.

FARNESE BACCHUS, a torso of Bacchus, an example of Greek sculpture of the 4th century B.C. It is in the National Museum at Naples.

FARNESE BULL, a group of statuary representing Dirce, whom the sons of Antiope, her slave, are preparing to bind to the horns of the wild bull, which Dirce had intended to be the instrument of her vengeance upon Antiope. This is the most elaborate and dramatic, almost melodramatic, group to be found among the monuments of Greek art. It is the work of the vivacious Rhodian school, executed by Apollonius and Tyriscus. It was transported to Rome, and there lost sight of for some hundreds of years. It was dug up in excavating the baths of Caracalla and in 1786 sent from the Palazzo Farnese to the National Museum at Naples.

FARNESE HERCULES, a colossal statue, dating from the age of Hadrian, supposed to be a marble copy by Glyeon of a bronze by Lysippus. It is an example of the turgidity and exaggeration which marked the decadence of Greek sculpture, wherein passion for scientific display triumphs over all sense of ideal beauty, proportion and repose. Hercules is represented as leaning on his club, holding in one hand the Hesperidian fruit. The statue was dug up in the baths of Caracalla and passed through the Farnese family to the museum at Naples.

FARNESE HOMER, a bust of the Father of Poetry, which evidently belongs to the later period of Greek sculpture. It is in the National Museum at Naples.

FARNESE JUNO, a colossal head, a copy of a bronze original, representing Hera, «the Queen of Gods.» It is in the National Museum, Naples.

FARNESE MINERVA, The, an archaic statue of Athene, found at Velletri, at the foot of the Alban Hills, Italy. It is supposed to be a copy of the chryselephantine statue of Phidias, which stood in the main shrine of the Parthenon.

FARNHAM, färn'am, **Eliza Woodson Burhaus,** American philanthropist: b. Rensselaerville, N. Y., 17 Nov. 1815; d. New York, 15 Dec. 1864. She traveled extensively; returned to New York in 1841; visited the State prison and lectured to the women convicts; and was matron of the Sing Sing State Prison for four years. She was the author of ‘California, Indoors and Out’; ‘My Early Days’ (1859); and ‘Woman and Her Era’ (1864), her most finished work.

FARNHAM, Ralph, American soldier: b. Lebanon, Me., 1756; d. Acton, Me., 1861. He was the last survivor of the Battle of Bunker Hill, and the first white settler in Acton. A public concert was given in his honor in Boston, October 1860, at which he was present. He was 104 years, 9 months and 19 days old when he died.

FARNHAM, Roswell, American soldier and lawyer: b. Boston, Mass., 23 July 1827; d. 1903. He was graduated at the University of Vermont in 1849, admitted to the Orange County bar in 1857, and served as State attorney 1859–61. During the Civil War he was successively lieutenant of the 1st Vermont regiment; provost-marshal of Newport News, Va.; and lieutenant-colonel of the 12th Vermont regiment from enlistment to disbandment. He was governor of Vermont 1880–82.

FARNHAM, or WEST FARNHAM, Canada, in the province of Quebec, on the Yamaska River, the Canadian P. and the C. V. railroads, about 40 miles southeast of Montreal.

There is a Roman Catholic college, convent and hospital. Tobacco growing is an industry; there are railway workshops; beet-sugar manufacture and dairy products. Pop. 3,560.

FARNHAM, England, a market town of Surrey, 35 miles southwest of London, on the Wey, and on the London and Southwestern Railway. It is the seat of Farnham Castle, the ancient palace of the bishops of Winchester, first built by Henry de Blois, brother of King Stephen. It was razed by Henry III, but rebuilt and garrisoned by Charles I. In 1662–84 it was restored by Bishop Morley. Saint Andrew's Church is an example of the transition period of Norman and Early English architecture. It was originally a chapel of ease to Waverley Abbey, the earliest Cistercian house in England, founded in 1128. The ‘Annales Waverlienses’ are believed to have suggested to Scott the name of his first novel. Farnham town hall and exchange are in the Italian style; it has also a grammar school, and a school of science and art. It was once noted for the manufacture of cloth. Hops of fine quality are grown in the neighborhood. William Cobbett was born in Farnham and is buried in Saint Andrew's churchyard. Hester Johnson, Dean Swift's «Stella,» was the daughter of a steward of Sir William Temple, who lived at Moor Park near Farnham. The town is a favorite residential centre and its proximity to Aldershot Camp has stimulated its commercial activity. The town grew up round the castle of the bishops and belonged to the latter for centuries. The waterworks and lighting plants are municipally owned. Pop. 7,365.

FARNUM, Dustin, American actor: b. Hampton Beach, N. H., 27 May 1876. He made his début with the Ethel Tucker Company in 1897, later appeared with Margaret Mather for 18 months and two seasons with Chauncey Olcott. He appeared in ‘The Virginian’ (1904); ‘The Ranger’ (1907); ‘The Rector's Garden’ (1908). He toured as Jim Carston in ‘The Squaw Man’ in 1909 and as Lieutenant-Colonel Morrison in ‘The Littlest Rebel’ in 1911. In 1913 he appeared in a revival of ‘Arizona.’

FARNUM, William, American actor, brother of Dustin Farnum: b. Boston, in the late seventies. His first public appearance on the stage took place at Richmond, Va., in ‘Julius Cæsar.’ He was next member of a stock company in Boston and subsequently toured the country with Margaret Mather and Olga Nethersole. His greatest successes were achieved in 1907 in ‘Ben Hur’ and ‘The Prince of India.’ The following year he played in ‘Society and the Bulldog’ and in 1911 appeared in ‘The Littlest Rebel’ in which his brother Dustin was starred.

FARNWORTH, färn'wẽrth, England, an urban district in Lancashire, three miles southeast of Bolton. It has a grammar school founded in 1715, and among its industrial establishments are paper-mills, iron foundries, cotton-mills, collieries, brick works, etc. The Bolton waterworks are at Farnworth. Pop. 28,131.

FARO, fä'rō, Portugal, a seaport on the south coast, capital of the district of Faro (pop. 272,861), on a bay protected by islands. It contains an old castle surrounded by Moorish fortifications. The town is well built, and has a fine square, a cathedral and a number of good schools. There is a considerable trade, chiefly in oranges, dried fruits, oil, cork, wine, etc. Deposits of antimony and of salt are in the neighborhood. In 1722 and 1755 the city suffered great damage and loss of life from earthquakes. Pop. 12,680.

FARO, fä'rō, is a gambling game pure and simple and one of the oldest «banking» games. A pack of cards is fastened in a clip, face downward, so that one card at a time can be withdrawn. The spectators, before it is turned face upward, bet, some that it will be one kind of card in value, such as ace, king, queen or jack; others that it will have this or that number of «pips» on it; others that it will be red or black. When all have been drawn but the last three the betting is restricted as to their order of appearance. Faro was introduced into France by the Venetian Ambassador in 1674, in a form like bassette; but so many nobles were ruined by this game that Louis XIV made a law against it. To elude this law it was called *pour et contre*, which gave rise to new prohibitions, to evade which the name Pharaoh was adopted. Faro is not a common game in the United States, although it is played at the large gambling houses in certain of the large cities, in the Far West and on the Pacific Coast. See GAMBLING.

FARÖE, fä'rō, or **FARÖER ISLANDS** (that is «Sheep Islands»), a group of islands in the Northern Ocean, lying between lat. 61° 25′ and 62° 25′ N., about 280 miles southeast of Iceland and about 190 miles northwest of the Shetland Islands; area 540 square miles. They belong to Denmark, and consist of about 20 islands, of which 17 are inhabited. The largest islands are Strömö (144 square miles), Osterö, Sandö, Suderö and Vaagö. The islands generally present steep and lofty precipices to the sea; the surface rises toward the interior, Slattaratinde in Osterö being 2,894 feet high, while a pinnacle called the Witch's Finger is said to be 3,000 feet. The climate is milder than the latitude might indicate, but the weather is very variable; the annual rainfall is about 70 inches. Sheep and horses can winter in the open air. The soil is generally thin; barley is the only cereal that comes to maturity; turnips and potatoes thrive well. There are no trees, but abundance of excellent turf and also coal. The wealth of the inhabitants is chiefly derived from fishing and the feeding of sheep. The feathers of sea-fowl form an important article of trade, and coarse woolens are manufactured. Some horses and cattle are kept; the former are small, but strong and hardy. Thorshavn, in Strömö, is the seat of government and the only town. These islands have belonged to Denmark since 1380. The inhabitants are Norse, and speak a Norse dialect in which there are a number of old ballads extant; the official language is Danish. They have autonomy in local affairs, and are also represented in the Danish Parliament by two representatives elected by the people. Pop. 18,000, mainly Lutheran in religion. Consult Jeaffreson, ‘The Faröe Islands’ (1897); Annandale, ‘The Faröes and Iceland’ (1905).

FARQUHAR, fär'kwär, **George,** Irish dramatist: b. Londonderry 1678; d. April 1707. The son of a clergyman and himself intended for the Church, he was a student at Trinity College, Dublin, but became an actor, and by accident having stabbed a fellow-player during a performance, gave up acting for good. About 1696–97 he went to London, where he commenced writing for the stage. His first production was 'Love and a Bottle,' performed with great success in 1699. In 1700 he became a lieutenant in Orrery's Regiment, but later sold his commission. In 1700 he added to his reputation by his comedy of 'The Constant Couple,' in which, under the character of Sir Harry Wildair, he exhibited a lively picture of the foppish fine gentleman of the end of the 17th century. In 1701 appeared 'Sir Harry Wildair,' a sequel to the former; and the following year he published a volume of 'Miscellanies.' 'The Inconstant, or the Way to Win Him,' appeared in 1703, and is among those which have kept possession of the stage. In 1706 appeared 'The Recruiting Officer,' one of his most popular plays; and this was succeeded by 'The Beaux' Stratagem,' which is reckoned his masterpiece. The last named was written in six weeks during its author's fatal illness; he had been given £30 for the copyright before beginning it; and it was the rage of the town while he lay dying in poverty. His wit is genuine and spontaneous, and his characters are admirably supported and drawn from nature. Ireland, the recruiting officer, the disbanded soldier, love and the bottle — types and subjects are all done to the life. His plots excel in the arrangement of incidents and in unity of action. The libertinism of language and sentiment which his works exhibit cannot be defended; but it was the vice of the age rather than the writer, who was much less culpable in this respect than Dryden or Wycherley. Consult his 'Dramatic Works,' edited with a 'Life' by Ewald (London 1892).

FARQUHAR, Norman von Heldreich, American naval officer: b. Pottsville, Pa., 11 April 1840; d. 3 July 1907. He was graduated at Annapolis in 1859; was acting master in the African squadron engaged in the suppression of the slave trade 1859–61; and, during the Civil War, served in the North Atlantic blockading squadron. He commanded the *Trenton* when she was wrecked at Apia, Samoa, in 1889; became chief of the Bureau of Yards and Docks in 1890; and commandant of the Norfolk navy yard. He became rear-admiral in 1899, and retired 1902.

FARQUHARSON, Joseph, Scottish painter: b. 1842. He inherited his love for painting from his father, who himself was an artist of some note. He learned his art in Edinburgh, and from 1859 to 1881 his pictures regularly appeared in the annual exhibitions of the Royal Scottish Academy. In 1880 he determined to perfect himself by a visit to the Parisian ateliers, and for several winters worked there under Carolus Duran. In 1900 he was elected an associate of the Royal Academy and in 1915 an Academician. The reproductions of his Scottish winter scenes in black and white have attained wide popularity. Among his most noted pictures are 'Day's Dying Glow' (1873); 'Wonderland' (1879); 'Joyless Winter Days' (1883); 'The English Vintage' (1884); 'In Cairo' (1886); 'Under the Palm Trees' (1887); 'Summer Days' (1887); 'My Heart's in the Highlands' (1890); 'He Led Them Wandering O'er the Sandy Way' (1891); 'Leaving the Hills' (1892), etc.

FARQUHARSON, Martha. See FINLEY, MARTHA.

FARRAGUT, făr'ạ-gut, **David Glasgow,** American naval officer: b. Campbell's Station, Tenn., 5 July 1801; d. Portsmouth, N. H., 14 Aug. 1870. His mother, Elizabeth Shine, sprang from the Scottish family of MacIver. His father, George Farragut, was born on the island of Minorca in 1755. He was descended from an ancient and noble Spanish family, originally of Aragon but for 400 years of the Balearic Islands, where they held many positions of trust and responsibility. George Farragut came to America in 1776, espoused the colonial cause and served creditably in the army, is said to have saved the life of Colonel Washington at the battle of the Cowpens, and was afterward a sailing master in the navy.

Commander David Porter had been a shipmate of George Farragut. The latter had been transferred to the naval station at New Orleans and had bought a plantation on the Pascagoula River, where Porter visited him. The commander took a great fancy to David, and with his father's consent — his mother being dead — practically adopted him with the intent of putting him in the navy.

David Farragut was warranted midshipman on 17 Dec. 1810, being less than 9½ years old. He had been nearly two years at school in Chester, Pa., when in August 1811 he was ordered to the frigate *Essex,* Porter's ship. He was in all the minor engagements before the famous *Essex* sailed on her unprecedented cruise to the Pacific. Such was the scarcity of officers that in June 1813 the little midshipman, not quite 12, was made prize master of the whaler *Barclay.* The English captain was sent along as adviser. He attempted to take things into his own hands, but Farragut, with a coolness and courage remarkable, retained command and brought his vessel into port.

He was slightly wounded in the terrific battle in which the *Essex* was destroyed by the *Phœbe* and *Cherub.* During a crisis in the action Porter actually sent this stripling to shoot a seaman who was reputed to be flinching from his gun. Farragut would have carried out his captain's orders if he had been able to find the man. In writing his report to the Secretary of the Navy Porter was compelled to say that Farragut was too young for the promotion he had earned by his gallant conduct.

After the war he remained in the service, taking advantage of such educational opportunities as were afforded him between and during his cruises. In the spring of 1819 he was appointed acting lieutenant of the brig *Shark,* being then 18 years of age. In 1823 cruised in the West Indies against Cuban pirates. He was married in September 1823 to Miss Susan C. Marchant of Norfolk. He was commissioned lieutenant 23 Jan. 1825. In 1828 witnessed the capture of San Juan de Ulloa by the French while in command of the *Erie.* Mrs. Farragut died 17 Dec. 1840, leaving no children. He was commissioned commander 9 Sept. 1841 and in December 1843 married Miss Virginia Loyall of Norfolk; by her had one son. During the Mexican War Farragut commanded the *Saratoga.* Had no opportunity for distinction and became involved in a dispute with Com. M. C. Perry, commanding naval forces. August 1854 established Mare Island Navy Yard, Cal.; commissioned captain 14 Sept. 1855. In general, his service between 1815 and 1861 was arduous and exacting and was diligently and successfully performed. His devotion to Union sentiment forced him to leave Norfolk in April 1861. Removed his family to Hastings-on-Hudson, N. Y., and at first vainly sought orders to active service.

In January 1862 was given command of the Western Gulf blockading squadron and ordered to open the mouth of the Mississippi River by taking New Orleans, which was defended by two forts, a river fleet of 17 vessels, including fireships and rams. The way up the river was barred by a boom. Farragut had a superb fleet of 6 heavy ships, 16 gunboats, 21 mortar vessels and 5 smaller craft.

On 24 April 1862 the boom was broken, the forts passed and the river defense fleet annihilated after a sanguinary and desperate battle. New Orleans surrendered four days later. The daring of the attack was only equaled by the skill with which it had been planned. Three vessels of the fleet failed to pass the forts. The *Varuna* was sunk, the flagship *Hartford* grounded in the midst of the action and was set on fire by a fireship pushed against her by the Confederate ram. She was got off in safety, however. As Farragut said, «They had a rough time.»

Ordered to clear the Mississippi, in June 1862, Farragut passed the batteries at Vicksburg, but there being no land force there to co-operate with him he repassed the batteries and returned to New Orleans. Was commissioned rear-admiral 16 July 1862, the first in the United States service. On 14 March 1863 attempted to take his fleet past the Confederate works at Port Hudson. Grant was then operating against Vicksburg. Farragut perceived that if he could get ships below Vicksburg he could prevent Confederate forces in that city from receiving supplies and reinforcements from west of the Mississippi. Farragut's conception was strategically sound and brilliant. He boldly endeavored to carry it out.

Still in the *Hartford*, with a gunboat lashed alongside, he passed the batteries under a terrific fire. None of the other vessels succeeded in getting past. The *Mississippi*, of which George Dewey was the executive officer, grounded, was set on fire by Confederate shells and burned to the water's edge. Farragut had only partially succeeded. Still the *Hartford* and the *Albatross* patroled the river and practically cut all communication west of Vicksburg.

After the fall of Port Hudson he returned to New Orleans and on 1 Aug. 1863 sailed for New York to recuperate his health, impaired by his arduous labors. In January 1864 took command of the naval forces acting against Mobile. On the morning of 5 August entered the bay. The mouth was protected by two formidable forts, Morgan and Gaines. The narrow channel was obstructed by piling and lines of floating torpedoes. Farragut's fleet comprised 30 vessels, of which 8, including the flagship *Hartford*, were steam sloops-of-war of the first class. There were 4 monitors and 18 gunboats.

He attempted the passage with seven of his heavy sloops, each one lashed to a gunboat on its port side. The four monitors, the *Tecumseh* leading, were sent ahead, followed by the *Brooklyn-Octorara* couple, then the *Hartford-Metacomet* couple, and the other ships in succession. Farragut had ordered the column to pass close under the walls of Fort Morgan, through an opening left free of torpedoes for blockade runners.

At 7:45 A.M. the *Tecumseh* opened fire. The Confederate batteries did not reply until 20 minutes later. In Mobile Bay lay three gunboats and the ironclad ram *Tennessee* (Com. Franklin Buchanan), a match, it was believed, for the whole Union fleet. As Farragut approached, the ram took a position behind the torpedo line. In his eagerness to engage this redoubtable foe, Craven, on the *Tecumseh*, disobeyed the admiral's order, and instead of passing through the opening, headed for the *Tennessee*. He struck a torpedo and was blown up just as the *Brooklyn* got fairly under fire. Striking empty shell boxes thrown overboard from the vessels preceding, it was thought she was in danger of torpedoes. She stopped and swung with her head toward the fort where none of her guns bore. The Confederates poured a rain of shot and shell upon her. The *Hartford*, coming up fast, nearly fouled the *Brooklyn*. The hesitant ships were bunched and made a target for every Confederate gun. The battle seemed lost.

Farragut, ascertaining that the *Brooklyn* had stopped for fear of torpedoes, ordered the *Hartford* to the head of the line, giving utterance to that immortal phrase: «Damn the torpedoes! Go ahead!» The *Hartford* passed the *Brooklyn*, narrowly escaping shoals to port and raced up the bay toward the *Tennessee*. It was now impossible to pass through the designated channel and Farragut drove the *Hartford* across the torpedo line. The example of the admiral put spirit into the *Brooklyn* and with the other ships she followed the flag. Fortunately no other torpedoes exploded and the whole fleet successfully passed the forts after a bloody and desperate battle.

The *Tennessee* had ranged along the Union ships and, immune to their fire, had shelled them at will. As soon as the passage had been made, the Union gunboats were cast off from the frigates and the Confederate gunboats were captured or driven to the shelter of Fort Morgan. At 9 A.M. the *Tennessee*, with surprising gallantry, came up toward the *Middle Ground* to engage the Union fleet. To this battle Farragut was nothing loth. By his orders the wooden ships were hurled upon their antagonist. The *Monongahela* struck her a terrific blow at a right angle. The *Lackawanna* repeated the ramming tactics. The bows of the wooden ships were stove in to the water line. Both ships were raked by the *Tennessee's* rifles, their return broadsides doing no damage to the iron plating. The *Tennessee* made straight for the *Hartford*, which was bearing down directly upon her, bows on. One or the other ship would have been sunk had not the *Tennessee* swerved so that the *Hartford* struck her a glancing blow. The ram was now beset by all the vessels of the Union fleet which could get at her. She was rammed, hammered and

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pounded. The monitors with their heavy guns were racking her from stem to stern. In the mêlée the *Lackawanna* rammed the *Hartford*, cutting her down to the water's edge. Finding his ship would still float, Farragut ordered her again to ram the *Tennessee*. By this time the ironclad's smokestack had been shot away, the casemate was an inferno, the heavy battering had jammed the port shutters, shot had entered through the ports, not a gun could be fired, steam ran down in the boilers. She could neither fight nor fly, so she surrendered, after one hour of as fierce fighting as was ever recorded.

During the passage of the forts Farragut had taken position in the main rigging in order to get above the smoke of the battle and be able to direct the manœuvers of the fleet the better. The quartermaster had passed a lashing around the admiral so that in case he should be wounded and lose his footing he would not fall to the deck.

In the battle Farragut should have led in the *Hartford*. It was only the urgent representations of his captains that made him take the second place. The battle was nearly lost by the gallant Craven's disobedience of orders, and that it was finally won was due to the personal initiative of the admiral himself.

This completed his service during the war. He was 64 years old when he fought the battle of Mobile Bay. His health was quite broken. He was commissioned vice-admiral 23 Dec. 1864; admiral 26 July 1866; sailed 28 June 1867 from New York in the steam frigate *Franklin* for an extended cruise in European waters, where he received such a welcome and was accorded such honors as have been tendered no other American save General Grant. He returned to New York on 10 Nov. 1868, visited the Pacific Coast in the summer of 1869 and died 14 Aug. 1870. He was accorded the honor of a public funeral in New York 30 September, and was buried at Woodlawn Cemetery, Westchester County.

Farragut was a rather small man with broad shoulders and a well-knit, vigorous frame. His face was long with a broad high forehead and an aquiline nose. His complexion was dark and his eyes brown. He was a cultivated gentleman of the highest type, a most accomplished officer, a lion in bravery, a woman in gentleness. He was a simple-minded Christian of a high and humble type, a communicant of the Protestant Episcopal Church. A statue of him by Saint Gaudens stands in Madison Square, New York; one by Kitson in Boston; another by Vinnie Ream Hoxie in Washington. In the church of the Incarnation, New York, is a mural tablet, with a bas-relief, of the admiral by Launt Thompson. Consult 'Life and Letters,' by his son; Mahan, 'Admiral Farragut' in the 'Great Commanders Series'; Barnes, 'Admiral Farragut'; Spears, 'David G. Farragut' (1905); Parker, 'Battle of Mobile Bay'; Brady, 'The Southerners.'

Cyrus Townsend Brady.

FARRAKHABAD. See Farukhabad.

FARRAND, Livingston, American anthropologist and educator: b. Newark, N. J., 14 June 1867. He was graduated at Princeton in 1888, and at the College of Physicians and Surgeons of Columbia University in 1891. He studied at Cambridge University in 1891–92 and at the University of Berlin in 1892–93. From 1893 to 1901 he was instructor in psychology, from 1901 to 1903 adjunct professor, and from 1903 to 1914 professor of anthropology at Columbia University. In 1914 he was chosen president of the University of Colorado. He has published 'Basis of American History' (1904), and contributions to psychological and anthropological publications.

FARRAND, Max, American educator: b. Newark, N. J., 29 March 1869. He was graduated at Princeton University in 1892 and received the degree of D.Ph. from that university in 1896. He is a graduate student of history of the universities of Princeton, Leipzig and Heidelberg. From 1896 to 1901 he was successively instructor, associate professor and professor of history at Wesleyan University. From 1901 to 1908 he was professor and head of the department of history at Leland Stanford Junior University. In 1905–06 he was acting professor of American history at Cornell and in 1908 was appointed to the chair of history at Yale University. He has published 'Legislation of Congress for the Government of the Organized Territories of the United States, 1789–1895' (1896); translation of Jellinek's 'Declaration of the Rights of Man and of Citizens' (1901); 'Records of Federal Convention of 1787' (3 vols., 1911); 'The Framing of the Constitution' (1913), and contributions to the *American Historical Review* and other historical periodicals.

FARRANT, făr'ạnt, **Richard,** English composer: b. 1530; d. 1580. Very little is known of his history. He was a gentleman of the Chapel Royal for some time up till 1564, when he became organist and choirmaster of Saint George's, Windsor, but in 1569 he was again appointed to the Chapel Royal. His music is ecclesiastical, and is distinguished by purity, simplicity, tenderness and elevation of tone. The anthems 'Call to Remembrance,' and 'Hide not Thou Thy Face,' composed by him, are well known and highly esteemed by lovers of good music. The exquisitely beautiful anthem, 'Lord, for Thy Tender Mercies' Sake,' has been attributed to him, but also by early writers to John Hilton.

FARRAR, Adam Story, English clergyman: b. London, 20 April 1826; d. Durham, England, 11 June 1905. He was graduated at Saint Mary's Hall, Oxford, 1850; M.A. Queen's College 1852; B.D. 1864; Michel Fellow of Queen's College, Oxford, 1852–63; public examiner in classics and mathematics 1854–56; tutor at Wadham College 1855–64; select preacher at Oxford 1856–57, 1869–70; Bampton lecturer 1862; select preacher at Cambridge University 1875, 1881. From 1864 until his death he was professor of divinity and ecclesiastical history in the University of Durham. He was succeeded by R. J. Knowling. He was made canon of Durham in 1878. His most important work is 'A Critical History of Free Thought in Reference to the Christian Religion' (1862).

FARRAR, Edgar Howard, American lawyer: b. Concordia Parish, La., 20 June 1849. He was graduated at the University of Virginia in 1871 and studied law at the University of

Louisiana, being admitted to the bar in 1872. In 1878–80 he was assistant corporation counsel and in 1880 corporation counsel of New Orleans. He was for years chairman of the Executive Committee of One Hundred to reform the municipal government of New Orleans. He was chairman of the committee of safety formed to prosecute the Mafia assassins of the chief of police and led the campaign which defeated the proposition to extend the charter of the Louisiana Lottery. He was one of the organizers of the National Democracy in 1896 and made a notable address on the money question at the Indianapolis Convention. In 1906–08 he was president of the Louisiana Tax Commission and in 1910–11 was president of the American Bar Association. In 1882 he was selected by Paul Tulane as one of the trustees of the fund exceeding $1,000,000 to found Tulane University.

FARRAR, Eliza Ware Rotch, American writer: b. Flanders, Belgium, 1791; d. Springfield, Mass., 22 April 1870. She married Prof. John Farrar of Harvard University. Her works include ‹The Children's Robinson Crusoe›; ‹The Story of Lafayette›; ‹The Youth's Love-Letters›; ‹Congo in Search of His Master› (1854); and ‹Recollections of Seventy Years› (1865).

FARRAR, Frederic William, English clergyman and author: b. Bombay, 7 Aug. 1831; d. London, 22 March 1903. He studied at King William's College, Isle of Man, and Trinity College, Cambridge, having gained one of the college scholarships. He was ordained deacon in the Established Church 1854 and priest in 1857, and for 16 years was an assistant master at Harrow. From 1871 till 1876 he was head master at Marlborough College, resigning on his appointment as a canon of Westminster and rector of Saint Margaret's. In 1883 he was appointed archdeacon of Westminster, and in 1895 became dean of Canterbury. From 1890 till 1895 he acted as chaplain to the House of Commons. Besides identifying himself with various social and philanthropic movements, he published many popular and able works of various kinds. In fiction he published ‹Eric, or Little by Little› (1858); ‹Julian Home: a Tale of College Life› (1859); ‹Saint Winifred's› (1862); ‹Gathering Clouds: a Tale of the Days of Saint Chrysostom› (1895); in philology; ‹Origin of Language› (1860); ‹Families of Speech› (1870); ‹Language and Languages› (1878), etc.; and on theological and religious subjects: ‹Seekers After God› (1868); ‹The Witness of History to Christ› (1871); ‹Life of Christ› (1874), a work which achieved extraordinary popularity; ‹Life of Saint Paul› (1879), also highly popular; ‹Early Days of Christianity› (1882); ‹History of Interpretation› (1885); ‹Sermons and Addresses in America› (1886); ‹Eternal Hope› (1888); ‹Lives of the Fathers› (1889), a popular work; ‹The Bible: Its Meaning and Supremacy› (1897); ‹The Herods› (1897); ‹The Life of Lives› (1900). In August 1885, he came to the United States, thereby realizing what he said had been one of the desires of his life. He remained in this country until the beginning of December, traveling, visiting friends and lecturing. He was a man of great eloquence, tremendous energy and was greatly beloved by all ranks, high as well as low. His most intimate American friend was Phillips Brooks.

FARRAR, Geraldine (Mrs. Lou Tellegen), American grand opera singer: b. Melrose, Mass., 28 Feb. 1882. She began her musical education under Mrs. Long at Boston, and under Madame Thursby of New York. Later she studied at Paris and Berlin. On 15 Oct. 1901 she made her début at the Royal Opera House, Berlin, as Marguerite in ‹Faust.› She achieved an instant success and was at once engaged for three years in Berlin, where she was a prime favorite. In 1906 she returned to her native land, and thereafter appeared as a member of the Metropolitan Opera Company, New York. Her principal rôles include Marguerite, Butterfly, Manon, Micaela, Mignon, Elizabeth, Tosca, Zerlina, Juliet, Gilda, Violetta, etc.

FARRE, fär, **Jean Joseph Frédéric Albert,** French general: b. Valence, Drôme, 1816; d. 1887. In 1859 he led the pioneer corps of the army of occupation at Rome and in the Franco-Prussian War had charge of the fortifications of Arras. In November 1870 he was placed in command of the three divisions of the Army of the North. When Manteuffel drove him from before Amiens, he was replaced by Faidherbe. In 1879 he was appointed Minister of War, and during his administration he removed from office all officers suspected of favoring the Legitimist or Bonaparte cause. Becoming unpopular because of his measures against Tunis he was superseded as Minister in November 1881. He was elected life senator in 1880.

FARRELL, James A., American steel manufacturer: b. New Haven, Conn., 1863. He was educated in the public schools of New Haven and began work in a steel wire mill there at the age of 16. In 1888 he was employed as laborer in the mills of the Pittsburgh Wire Company, of which he rose to be superintendent and manager. Subsequently he became general superintendent of the Oliver Steel Wire Company and general manager of the Oliver Iron and Steel Company. He organized a wire company at Braddock, Pa., which became part of the American Steel and Wire Company, of which Mr. Farrell was general manager of exports until 1903. From 1903 to 1911 he was president of the United States Steel Products Export Company and in January 1911 became president of the United States Steel Corporation.

FARREN, Elizabeth, English actress: b. 1759; d. 1829. Her father, George Farren, was a strolling player and Elizabeth appeared on the boards while still a child. In 1777 she made her London début at the Haymarket as Miss Hardcastle in ‹She Stoops to Conquer.› In the following year she appeared at Drury Lane, where she played for several years, succeeding Mrs. Abingdon in 1782 as leading lady in comedy. Her chief rôles were Lady Townly, Lady Fanciful, Clarinda in ‹The Suspicious Husband,› Lady Betty Modish in ‹The Careless Husband,› Lady Emily Gayville in ‹The Heiress,› Julia in ‹The Rivals,› and Lady Teazle in ‹The School for Scandal.› Her last appearance was as Lady Teazle on 8 April 1797. On 1 May of that year she became Countess of Derby. Her portrait by Sir Thomas Lawrence is in the Metropolitan Museum, New

York. Consult Doran, 'Annals of the Stage,' edited by Lowe (London 1888); Galt, 'Lives of the Players' (ib. 1831); Geneste, 'History of the Stage' (Bath 1832); Matthews and Hutton, 'Actors and Actresses of Great Britain and the United States' (New York 1886).

FARREN, William, English actor: b. 13 May 1786; d. London, 24 Sept. 1861. He was the son of an actor of the same name who was long prominent at Covent Garden. William, Jr. made his début at Plymouth at the Theatre Royal in 'Love à la mode.' In 1818 he appeared in London at Covent Garden as Sir Peter Teazle, a part in which he achieved great success. For 10 seasons he played at Covent Garden and in 1824 began a series of summer engagements at the Haymarket, always appearing in comedy rôles. In 1828–37 he played at Drury Lane, and here he essayed more ambitious rôles, including Cæsar. After 1837 he again appeared at Covent Garden and later became stage manager at the Haymarket. In 1843 he was stricken with paralysis, and although he continued on the boards for 10 years more his acting never reached its former high level. In 1850–53 he was lessee of the Olympic. In his later years he played old men parts, a field in which he was without a rival. His final appearance was at the Haymarket in 1855. His sons William (1825–1908) and Henry (1826–60) were both successful actors. Henry's daughter Ellen ["Nellie"] Farren [b. 1848; d. 1904] became famous for her portrayal of boy's parts in the Gaiety musical burlesques. Consult Cook, 'Hours with the Players' (London 1881).

FARRER, făr'ĕr, **Edward,** Canadian journalist: b. County Mayo, Ireland, 1850. He received his education at Stonyhurst College, England, and at the Jesuit College, Rome. In 1870 he went to Canada and entered on his career of journalist as editorial writer on the Toronto *Daily Telegraph,* later joining the *Mail.* In 1874 he returned to Ireland as Canadian immigration agent, and subsequently became foreign editor of the New York *World.* In 1882–84 he was chief editor of the Toronto *Mail,* and thereafter was successively editor of the Winnipeg *Times* and *Sun* and the Toronto *Globe.* He retired in 1892, removed to Washington, D. C., for some years, but returned to Canada in 1905 and settled at Ottawa, where he corresponded for foreign journals. Farrer is by many considered the ablest editorial writer of Canada, although his animosity toward his old faith caused the epithets of renegade and bigot to be leveled at his head. He also roused the ire of the Loyalists and Tories by advocating the annexation of Canada to the United States.

FARRER, Henry, American artist: b. London, England, 23 March 1844; d. 1903. He was the son of an English miniature painter, Thomas Farrer (1770–1850), and came to New York in 1863. He painted largely in water colors, but was widely known as an etcher also. The best of his etchings are views about New York harbor, in which his treatment of sky is very successful.

FARRER, Thomas Henry, 1st Baron, English economist: b. London, 24 June 1819; d. Abinger Hall, Dorking, 11 Oct. 1899. He received his education at Eton and Balliol College, Oxford. In 1844 he was called to the bar, but remained in practice only a few years. In 1850 he entered the public service as secretary to the naval department of the Board of Trade. In 1865 he was appointed one of the joint secretaries of the board and two years later was made permanent secretary. His administration, extending over a period of 20 years, was productive of many reforms, and in 1883 he was created a baronet and retired from office three years later. He was an ardent advocate of Free Trade and in 1886 published 'Free Trade versus Fair Trade,' in which he dealt with the pressing economic problems of that day. In 1889 he became alderman of the London county council and the following year became vice-chairman of that body. He was raised to the peerage in 1893 and spent his remaining years advocating and expounding his free trade doctrines in press and platform. His 'Studies in Currency' appeared in 1898.

FARRIER, a professional shoer of horses, or, in a more general sense, a practitioner of the veterinary art. His business is termed farriery. As one who professes skill and a member of a "common calling," the farrier is obliged to practise his art on demand and to execute it with ordinary skill and care. He is liable in law for negligence and has a lien on the animal shod for expenses. In modern times the term has come to be associated with one who, in addition to horse-shoeing, possesses a knowledge of the anatomy and physiology of the horse's foot and hoof, and is able to diagnose and prescribe treatment for the various ailments peculiar thereto.

FARRIERY. See Farrier.

FARRINGTON, Oliver Cummings, American geologist: b. Brewer, Me., 9 Oct. 1864. He was graduated at the University of Maine in 1881, became lecturer on mineralogy in the University of Chicago in 1894 and curator of geology at the Field Columbian Museum in the same year. He has published 'Meteorites'; 'The Volcanoes of Mexico'; and 'Gems and Gem Minerals' (1903).

FARS, färs, or **FARSISTAN,** făr-sis-tăn' (ancient Persis), Persia, province in the southwest, about 300 miles long by 250 miles broad. Its chief rivers are the Bandamir, the Sefid-rud and the Mand, and it has several salt lakes, of which the largest is that of Bakhtegan. The climate is not unhealthful, except along the coast, where it is very hot in the summer. The most important products are grain, rice, fruit, wine, oil, cotton, tobacco, silk, cochineal and attar of roses. The manufactures include woolen, silk and cotton goods, and in these and other articles an active trade is carried on, chiefly with India. Many ancient ruins are scattered over the province. The capital is Shiraz and the chief port is Bushire or Abushehr. About 30 miles north of Shiraz are the ruins of Persepolis, an ancient city. The people of this province are among the best preserved types of the Aryans. Pop. (estimated) 1,700,000. See Persia.

FARSAN (făr-săn') **ISLANDS,** a group of two larger and several small islands on the east side of the Red Sea. The surface is diversified by hills composed of coral and occasional valleys and plains. Pearl-fishing is here an important industry.

FARUKHABAD, fŭ-rook'ä-bäd, or **FARRAKHABAD,** fur-ruk-ä-bäd', **India:** (1) town in India, in a district of the same name in the United Provinces, about two miles west of the Ganges, 90 miles west-northwest of Lucknow. It forms a single municipality with Fatehgarh, the civil headquarters of the district, situated three miles to the east. An American Presbyterian mission is located here. Pop. (1911), with cantonment, 59,647. (2) The district of Farukhabad forms part of the Agra division and lies mainly along the right bank of the Ganges. Area, 1,685 square miles. Pop. about 950,000.

FARWELL, Charles Benjamin, American merchant and legislator: b. Painted Post, N. Y., 1 July 1823; d. Lake Forest, Ill., 23 Sept. 1903. Having gone in 1838 to Illinois, he was there engaged in farming and government survey work until 1844, when he entered a mercantile career in Chicago. He accumulated a fortune in the dry-goods trade. In 1869 he was a national bank examiner, in 1871–77 and 1881–83 a representative in Congress. From 1887 to 1891 he was United States senator, having been elected to fill the vacancy caused by the death of Gen. John A. Logan. He was a figure of some prominence in both State and national politics.

FASANO, fä-sä'nō, Italy, city in the southeast, near the Adriatic, 45 miles northwest of Brindisi. It is in the midst of an olive district and there are numerous oil presses in the town and neighborhood. The chief trade is in oil and wine. The cottages of many of the peasants have been made from the stone taken from old walls. Fasano was at one time a wealthy residential and commercial city. Pop. of the commune, 20,077.

FASCES, fas'ēz (Lat. *fascis,* a bundle), the most ancient insignia of the Roman magistrates, consisting of bundles of rods, usually birch, bound with which was an axe with projecting blade; used as a symbol of authority. The fasces was carried by an attendant known as a lictor. The number of lictors varied according to rank and for a given dignitary frequently differed at different periods. Fasces were accorded quæstors in the provinces only.

FASCH, fäsh, **Karl Friedrich Christian,** German musician: b. Zerbst, 1736; d. 1800. His father was court capellmeister at Zerbst and Karl's early instruction was under his direction. In 1756 he was appointed cembalist to Frederick the Great at Berlin. He was capellmeister of the Berlin opera in 1774–76 but resigned his public appointments in the latter year and thereafter devoted all his attention to composition. He was the founder of the Berlin Singakademie. Fasch's church music was published in six volumes (1839). Consult the biography by Zelter (1801).

FASCIA, *in anatomy,* an animal tissue, consisting of dense connecting sheets or layers, of the nature of fibrous membrane, close and strong as tendon or ligament. The fascia in the economy of animal anatomy serves the purpose of confining within its proper area supporting as a sort of fulcrum, separating from one contiguous tissue, or attaching to another, some muscle, part or organ of the body. Consult the works on ‹Anatomy› of Quain and Morris, in English; of Gegenbaur and Rauber, in German; and of Testut and Poirier, in French.

In architecture, a flat band, running horizontally across an entablature. The architrave in the Corinthian and Ionic orders is divided into three bands which are called fasciæ; the lowest being called the first fasciæ, the middle one the second, and the upper one the third. When there are only two fasciæ, they are called the upper and lower. See Column; Entablature.

FASCINATION (Lat. *fascinare,* «to bewitch»). Various animals such as toads, hawks and notably certain varieties of serpents have been popularly invested with the power of controlling by their eyes the movements of intended victims. Such power has never been scientifically demonstrated and supposed manifestations have generally been explained as paralysis through fear on the part of the victim. For an account of the belief in the evil eye in human beings see Superstitions, Popular.

FASCINE, fă'sēn (Lat. *fascina,* a bundle of sticks), in fortification, a cylindrical bundle of faggots or brushwood used to form parapets, strengthen ramparts, elevate batteries, prepare temporary field defenses and the like. They vary in size from 6 to 18 feet in length, six to nine inches in diameter and are bound with withes. Fascines dipped in pitch or other combustible matter are sometimes used in order to set fire to the enemy's lodgments or other works. In civil engineering fascines are used in making sea and river walls to protect shores subject to washing; or to collect sand, silt and mud to raise the bottom and gradually form an island, either as a breakwater against inroads, or for purposes of cultivation, as in Holland.

FASCIOLARIA, a genus of mollusks. See Fusidæ.

FASHION, conventional usage in the matter of certain details of life, especially the changes and modifications of costume in civilized nations; mode or style in dress. Such variations of costume were unknown to most nations of the ancient world and among the Romans only influenced the accessories of the toilet. The unchanging East is as unchanging in its dress as in everything else and the fashions to which savage tribes uncompromisingly adhere remain unaltered for long periods. In some remote districts of European countries peasants still dress in the costume brought two or three hundred years ago by the local nobility from court and the smock-frock of the English agricultural laborer is a relic of Saxon times. (For detailed history of the costumes of different periods, see article on Costume and for certain principles underlying the subject, see Dress). Survivals in modern costume may sometimes be traced back to unexpected origins. With regard to the modern evening dress-coat we learn that it owes its peculiarities to its descent from the old-time everyday garment in which a man rode and worked. «The cutting away at the waist had once the reasonable purpose of preventing the coat skirts from getting in the way in riding, while the pair of useless buttons behind the waist are also relics from the times when such buttons really served the purpose of fastening these skirts behind; the curiously cut collar keeps the now misplaced notches made to allow of its being worn turned up or down.» It is said that the modern cylindrical hat is the indirect descendant of the Puritan steeple-crowned hat, carried across the Atlantic by the Pilgrim Fathers, thence again to France, when Benjamin Franklin and the young Republicans were the height of the fashion and by the French manipulated into the hat which they have given to all the world. Certain striking features in vogue at different times in the dress both of men and of women have originated in the lack of bodily symmetry or in other physical defects in various monarchs or other leaders of fashion. Until the 19th century men's clothes were as delicate in color and as rich in material as women's. Pepys records in his diary how he had his wife's gowns cut up into waistcoats for himself. The uniforms of officials or of persons connected with public or special service, the judge's and the clergyman's robe and the student's cap and gown cannot be said to have had their origin in fashion; nor can the indication of political or religious opinions by peculiarities of dress, as among Puritans and Quakers, or as illustrated by colored cockades or other party emblems be called phases of fashion, yet fashion has been sometimes closely connected with political changes. Dress attained its highest point of significance in France during the last half of the 18th century, when it marks unmistakably the various stages of the Revolution. Rousseau's ‘Emile and Nouvelle Héloïse’ and Goethe's ‘Werther’ brought sentimentality into fashion; women's hair was dressed in *bandeaux d'amour* or *poufs de sentiment;* and Marie Antoinette and the ladies of her court sought to return to the simplicity of nature by masquerading in the Trianon attired as shepherdesses and milkmaids. The works of Montesquieu and Voltaire had created an admiration for England and the courtiers of Versailles dressed themselves like English fox-hunting squires, while their wives and daughters got themselves up *à l'Anglaise* in coats with cuffs, collars and facings, beaver-hats and cravats. As the political turmoil increased, fashionable attire grew more and more eccentric and multiform, till at last republican institutions triumphed and the women of France began to clothe themselves as like as possible to those of Greece and Rome both in style and scantiness. They disregarded costly materials and shivered through the winter months clad in a few yards of muslin. Men wore a combination of antique and romantic costume invented by the painter David, which was finished off with Hungarian boots. At the present time the fashions for women in all civilized countries are set by Paris; for men, though not so exclusively, by London. One marked feature of the ever-changing kaleidoscope of fashion is its tendency to revolve in cycles. Cycles of alternate luxury and simplicity have also distinguished all ages. Fashions change more quickly each decade, a fact due in great measure to increased facilities of communication, while the triumph of democracy is shown by their universal adoption by all classes. Consult ‘Nos Aieules,’ translated as ‘Ten Centuries of Toilet,’ by Mrs. Cashel Hoey (1892); Boutet, ‘Modes feminines du XIXᵉ Siècle’ (Paris 1902); Geszler, ‘Die Moden des XIX Jahrhundert’ (Vienna 1897); Hill, ‘History of English Dress’ (London 1893); Price, ‘Dame Fashion, 1786–1912’ (ib. 1913); Uzanne, ‘Les Modes de Paris’ (Paris 1898). See also bibliography article COSTUME.

FASHODA, fä-shō'dä, Egyptian Sudan town founded in 1867 by the Egyptian government, situated on the Bahr-el-Abiad or White Nile, 400 miles south of Khartum and about 70 miles northeast of the confluence of the Sobat River with the Nile. In July 1898 it was occupied by a small French force, but some months later it was claimed by the British for Egypt. Ultimately the French force evacuated the town, which was then formally occupied by Sudanese troops.

FASSAITE, fas'ą-īt, the name applied to a pale green to pistachio or dark green variety of augite, or aluminous pyroxene. It occurs in metamorphic marly limestone in the Fassathal, Tyrol.

FASSETT, fas'ĕt, **Cornelia Adèle Strong**, American artist: b. Owasco, N. Y., 9 Nov. 1831; d. Washington, D. C., 4 Jan. 1898. She studied in New York as well as in Paris and Rome, and from 1875 lived in Washington, where she painted portraits of many prominent statesmen. Her most important work is ‘The Electoral Commission in Open Session,’ including the portraits of some 200 persons.

FASSETT, Jacob Sloat, American lawyer and capitalist: b. Elmira, N. Y., 13 Nov. 1853. He was graduated from Rochester University 1875; and was admitted to the bar 1878. In 1879–80 he was district attorney of Chemung County, and in 1880–81 studied constitutional law and political economy at Heidelberg University. He was State senator 1884–90 and was defeated as Republican nominee for governor in the year last named. He was temporary chairman at the Republican National Convention in Minneapolis in 1892. In 1905–11 he was a member of Congress from the 33d New York district. He was the proprietor of the Elmira *Daily Advertiser* from 1879 to 1896, and controls mining, banking and other interests in the Western States.

FAST AND LOOSE, the name of a cheating game, also called «pricking at the belt,» which appears to have been much practised by English gypsies in the time of Shakespeare, and which is still played at fairs, races and similar meetings under the name of «prick the garter.» The game consists in trying to pin to a table a belt or similar object so folded as to produce a misleading effect. The original name, in the phrase «to play fast and loose,» has gone into the language to designate the conduct.

FASTENRATH, Johannes, yō-hän'-nĕs fäs'ten-rat, German poet and story writer: b. Remscheid, 3 May 1839; d. 1908. A brief sojourn in Spain (1864) filled him with a permanent enthusiasm for its land and literature which inspired nearly all his life-work. He translated Juan Diana's comedy ‘Receipt Against Mothers-in-Law’; and compiled a series of volumes which are less translations than transcriptions in the spirit of the originals —‘A Wreath of Spanish Romances’; ‘Hesperian Blooms’; ‘The Book of My Spanish Friends’; ‘Voices of Christmas.’ He also published several works on the history of Spanish literature; and in Spanish, ‘Passion-Books of a German-Spaniard,’ a description of the

Oberammergau Passion Play; and 'Walhalla and the Glories of Germany.' A volume of war songs dedicated 'To the German Heroes of 1870' is likewise his.

FASTI, fas'tī (Lat. *fasti,* lawful, *fas,* divine law, DIES, days), in ancient Rome, days on which the transaction of business before the prætor was legal, days on which court did not sit being *dies nefasti.* The name thence came to be applied to two sorts of registers or tables: (1) The *fasti sacri* or *fasti kalendares,* containing the calendars of the year and corresponding to the modern almanacs. These were at first known only to the *pontifices,* or priests, who announced them to the people, and had thus a source of power and profit. In 304 B.C. Cn. Flavius, who had been secretary to the *Pontifex Maximus* Appius Claudius Crassus, exposed them to the people. (2) The *fasti annales* or *historici,* which formed a chronicle of contemporary events, containing the names of the chief magistrates of the year and a series of the more remarkable events noted in the order of the days of their occurrence.

FASTING. In its religious or magical signification, and as a social custom, fasting, by which is implied abstinence from food, and sometimes from drink as well, varies among different races. Among savage races the rite was enjoined at certain stages of life, as an act of mourning (when it is the usual precedent, and is occasionally preceded by a feast), as a rite of preparation at the initiation into manhood or womanhood or for sacred and ritual acts, as an act of penitence and as an ascetic practice. It is usually accompanied by continence, by other austerities, and by prayer. Among the American Indians the rite was widely observed, was practised both in private and in connection with public ceremonies, and tribal fasts were occasionally ordered by the chiefs to avert some threatened calamity. Among the Melanesians certain foods are forbidden to pregnant women, and fasting is enjoined on the fathers of newly-born children. So widely diffused was the custom that it was practised in nearly all the nations of antiquity — in Armenia, Persia, Scythia, Nineveh, Egypt, Greece and Rome. Among the Hindus it has always been an ascetic practice, although Gautama Buddha enjoined moderation rather than excessive fasting. Among the Jews the fasts were all founded on tradition, except that of the Day of Atonement, which was appointed by Moses, to which five days of compulsory fasting were afterward added, in commemoration of days of humiliation and national misfortune. With the Jews fasting always implies entire abstinence, and lasts, except on the Day of Atonement and the 9th of Ab, from daybreak to the appearance of the first three stars.

Although Our Lord fasted 40 days before the beginning of his public ministry and probably kept the Day of Atonement obligatory on his race, he left no direct rules for fasting. It was incongruous, he said, «that the children of the bridechamber fast when the Bridegroom was with them; but the days would come when the Bridegroom should be taken away from them, and then should they fast in those days.» (Mark ii, 19–20). Hence it was inferred that from the time of His ascension the practice was obligatory on His disciples, the temporary cause of exemption hitherto existing having ceased.

During the first two centuries of the Christian era fasting was voluntary on the part of the faithful, and was practised before holy acts and rites, such as baptism, communion and ordination. The Pascal fast is first mentioned by Irenæus (A.D. 195). The fast of 40 hours when Our Lord lay in the grave had gradually expanded in the 6th century into the 40 days Lenten fast, while the mode of fasting varied greatly. Fasts, Hooker explains, were «set as ushers of festival days,» their object being «to temper the mind, lest contrary affections coming in place should make it too profuse and dissolute.» The fast days in the Roman Catholic Church are: All the week days of Lent, beginning on Ash Wednesday; the Fridays in Advent; the Ember days, namely, Wednesdays, Fridays and Saturdays following (1) the first Sunday in Lent, (2) Whitsunday, (3) the 14th of September, (4) the third Sunday of Advent; also the vigils of Pentecost, the Assumption, All Saints and Christmas. When the vigil falls on Sunday the fast is kept on the Saturday preceding. The days of abstinence (on which flesh-meat is not allowed) are all Fridays in the year and fast days. Illness, old age and other causes may entitle a person to a dispensation from these regulations. The Anglican appoints the following fixed days for fasting and abstinence, between which no difference is made: (1) the 40 days of Lent; (2) the Ember days, at the four seasons; (3) the three Rogation days before Holy Thursday; (4) every Friday except Christmas Day. The difference between the Roman Catholic and the Anglican Church in regard to fasting is that, according to Hooker, the former holds it as an imperative means of grace, the latter as a useful exercise preparatory for the means of grace.

The practice of fasting was retained by the Protestant Reformers in Europe. In England it was rigorously enforced by parliamentary sanction, as shown in the acts of Edward VI and James I, and the proclamations of Elizabeth; but the abstinence from flesh-meat on fast days appears to have been enjoined mainly as an aid to the fishing and shipbuilding industries. In Scotland pre-communion fast days were appointed by the Presbyterian Church, when business was entirely suspended; but within recent times these have fallen almost entirely into desuetude.

Our Puritan forefathers brought with them to New England the practice of occasional appointments for special causes, named by the churches as well as by civil authority. The day before they left Leyden (21 July 1620), «when being ready to depart they had a day of solemn humiliation,» in anticipation of the voyage. Owing to a series of misfortunes that befell the Plymouth colony a solemn fast day was appointed, to be observed on Wednesday, 16 July 1623 (Old Style). The prejudice against popish and prelatical ordinances made the observance of Lent or of Good Friday obnoxious to the founders of New England, and no considerable change of sentiment in this regard took place till after the Revolutionary War. The occasional spring fast gradually passed into an annual appointment; but there was no annual spring fast previous to King Philip's War (1675–76). After the winning of independence, fast days were occasionally appointed. Coming to recent times, one was enjoined in 1849 on account of the cholera visitation; they were observed on both sides during the Civil War; and on the death of Abraham Lincoln (14 April 1865) a solemn fast was proclaimed for the 1st of June of that year.

Fasting is observed with great severity in the Greek Church. The fasts extend over three parts of the year. The Easter fast, extending for 48 days; the Advent fast for 39 days; the fast of the Virgin for 14 days, and that of the Apostles begins on the Monday after Trinity and extends to the 29th of June.

Mohammedanism has adopted the practice of fasting from Jewish and Christian sources. In addition to voluntary fasting during the month of Ramadan (in which the Prophet brought the Koran from heaven), eating, drinking, smoking and smelling perfumes are strictly forbidden; but the rigor of the fast is considerably modified by the removal of these restrictions in the intervening nights.

In fasting the tissues show considerably greater waste during the first few days than on those succeeding. Human beings can maintain life for eight days without food and drink, and longer if they are kept warm and resting. The supply of water wonderfully prolongs life. The 15 survivors of the wreck of the *Medusa* frigate in 1876 subsisted for 13 days on a raft without food. About the same time some miners were interned for 10 days without food and all recovered. Dogs can subsist from 30 to 35 days if deprived entirely of food and drink. Among famous fasters may be mentioned Sarah Jacobs, the Welsh girl, on whose behalf it was claimed that she had lived for two years without tasting food, but who succumbed after nine days when put under the watch of professional nurses; Jacques, who fasted for 30 days at Edinburgh in 1888, 42 days in London in 1890, and 50 days in 1891; and Succi, an Italian, who fasted for 40 days in London in 1890.

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FASTNET LIGHTHOUSE. See Cape Clear.

FASTOLF, fas'tolf, Sir **John,** English soldier: b. Caister, near Yarmouth, about 1378; d. there, 5 Nov. 1459. He saw much service in the French wars and distinguished himself in the battle of Agincourt, the capture of Caen, the siege of Rouen and other events. He was knighted about 1417, and made governor of the Bastile in 1420. In 1429 he was ordered to bring supplies to the English camp in front of Orleans, then in a state of siege. He went to Paris and obtained the provisions, but when returning was attacked at Rouvray by a French force much stronger than his own. In spite of this disadvantage, however, he succeeded in driving off the attacking party, mainly owing to the skilful manner in which he used barrels of herrings for defensive purposes. The battle is usually known from the last-mentioned circumstance as the Battle of the Herrings. Some have charged him with cowardly behavior in the subsequent battle at Patay, and it is said that the Duke of Bedford deprived him of the Garter which had been conferred on him in 1426. This charge, however, has never been substantiated. In 1432 he was appointed English Ambassador to the Council of Basel, and in 1441 he withdrew from the army. The ‹Paston Letters› (q.v.) contain a long account of his later life in Norfolk, and show him to have been keenly bent on amassing a large fortune. He has been regarded by some authorities as the prototype of Shakespeare's ‹Sir John Falstaff.›

FASTS. See Fasting.

FAT-BACK, a name for the menhaden (q.v.) and for certain mullets, in allusion to the thickness of the dorsal adipose tissue.

FAT-BIRD, a name among sailors for the guacharo; and among sportsmen in New Jersey for the pectoral sandpiper.

FAT TISSUE, or **ADIPOSE TISSUE,** the deposits of fat in various parts of the animal organism. Fat tissue consists of a specific form of cells which occur usually in groups. When fully developed the distended cell walls filled with fat are connected by a special delicate form of connective tissue, in which is a network of blood-capillaries enclosing each cell. In the living tissue the fat is liquid, but after death it congeals to a solid or semi-solid condition. The fats found in animal fatty tissue are mainly the triglycerides of stearic acid, palmitic acid and oleic acid. In the fat of man oleic acid is the largest constituent, making up 65 to 90 per cent of the fatty deposit. The proportion of palmitic acid ranges from 8 to 25 per cent; and of stearic acid, from 2 to 6 per cent, according to the part of the body from which the fat is derived. Other components of fat tissue are small percentages of lecithin, cholesterin and free fatty acids and of a yellow lipochrome which gives its hue to the fat. Fat is found in the young of vertebrate mammals from the moment of their birth, and under normal conditions continues to increase till puberty, when a marked diminution usually takes place. In middle life fat commonly increases and sometimes is acquired to gross excess. The origin of fat in the tissues has not been accounted for. It has been proved that while some of it is transferred from the fat eaten as food, other deposits seem to be due to a transformation of albuminous substance which is not understood. The function of fat in the body is not known, but it has been observed that fat in a proper quantity acts as a protective shield against atmospheric changes; serves as a lubricant to several organs and, above all, stores up the heat energy so essential to animal vitality.

FATA MORGANA, fā'tā mor-gā'nā, a remarkable aerial phenomenon observed in the Strait of Messina and other points in Italy and Sicily and thus called because supposed to be the work of the fairy Morgana (sister of Arthur and a pupil of Merlin). Objects are reflected sometimes on the surface of the sea and sometimes on a kind of aerial screen. An object has often two images, of which one is inverted.

FATALISM, the doctrine that all things are ordered for men by the arbitrary decrees of God or the fixed laws of nature. In theology it has given birth to theories of predestination, and in moral science to such systems as those of Spinoza and Hegel, and more recently to the philosophy of Herbert Spencer. It is carried out to its most pitilessly logical extreme among the Mohammedans, where everything that can happen is «kismet,» that is fated, or decreed by fate. See Determinism; Predestination; Will.

FATALITY IN COLOR. The color of a soldier's uniform is based upon a principle of fatality. Experience and statistics prove the relative visibility of the uniform is reflected in liability to casualties. Red is the most fatal color; the least fatal is Austrian gray. The proportions are: red 12; green seven; brown six; gray or blue five.

FATEGARH. See Fatehgarh.

FATEHGARH, FATHIGARH, FUTTYGURH, or FUTTIGARH, British India, headquarters of military district of Farukhababad (q.v.), three miles east of the city of that name and municipally joined to it. Pop. 12,500.

FATEHPUR. See Fathipur.

FATEHPUR-SIKRI, or FUTTIPUR-SIKRA, British India, the site of an ancient town in the district of Agra, United Provinces. It was the favorite residence of the Emperor Akbar, dating from 1569, who enclosed and fortified it. It is still surrounded on three sides by a great wall five miles in extent. The part of the palace containing the apartments of his celebrated Prime Minister, Abu-Fazel, is still in good preservation. It is built of dark red sandstone, in a fine style of Oriental Gothic, adorned with numerous pilasters and rich tracery and carvings, and crowned by two domes. In a tomb of elaborate workmanship, standing in the centre of an arcaded square and approached through a noble gate, several members of the royal family were interred. The modern town has (1911) 6,132 inhabitants. Consult Howell, E. B., 'Handbook of Agra and Taj,' etc. (1904); and Smith, E. W., 'The Mughal Architecture of Fatehpur-Sikri' (1894–98).

FATES, Μοῖραι, *Moirai;* Lat. *Parcæ,* in ancient mythology, the inexorable sisters who spin the thread of human life. Homer mentions neither their separate names nor their number. The appellation *Clotho* (the spinner) was probably at first common to them all. As they were three in number, poetry endeavored to designate them more precisely; *Clotho* became a proper name, as did also *Atropos* and *Lachesis.* Clotho means she who spins (the thread of life); Lachesis, the disposer of lots; Atropos, unalterable fate; so that all three refer to the same subject under different points of view. The first spins the thread, the second determines its length and the third cuts it. In Homer and Hesiod they appear as goddesses of human fate and individual destiny, both in life and death. Among the lyric poets they seem to have a general power over events, and are always present where anything is to be divided. In the narrowest signification they are the goddesses of death, as of that destiny which closes the scene with all. In this capacity they belong to the infernal world, and are daughters of Erebus and Night. As goddesses of fate they are the servants of Zeus and the offspring of Zeus and Themis. The former genealogy is the more modern. As daughters of Zeus, they have a share in the decisions of fate, and are commissioned by him to execute his commands.

FATHER, Duties of a. See Law of Family.

FATHER, The, a tragedy in three acts by Strindberg. Translated by N. Erichson. Soon after the Swedish original had been completed during a stay in Bavaria in 1887, a French edition was published with a preface by Emile Zola, who praises the drama very much, but finds fault «with too much philosophy» in places, while a stricter realism would be more pleasing. In the preface to 'Fröken Julie,' the author replies to critics who had resented the gloom of 'The Father': «Some people have accused my tragedy of being too sad, as though one devised a merry tragedy. I find joy of life in the powerful, terrible struggles of life; and the capability of experiencing something, of learning something, is a pleasure to me.» 'The Father' belongs to the «realistic» period in the complex development of the Swedish genius. When, after years of adverse criticism, this great tragedy was produced in his native country, it proved to be one of the strongest plays of the Swedish stage. Of his dramatic works, it is the most magnificent in composition, most powerful in its effect, most impressive in its condensed energy. All that the author has written before or after about married life, when it is a curse, may be regarded as only sketches or outlines in comparison with 'The Father.' With a power unsurpassed in its intensity, he has drawn a picture, so vivid and so pitiless, of the duel between the sexes, between husband and wife, for mastery. The captain and his wife become types. The woman, described as very common, rather stupid, and insane in her desire to rule and have her way, obtains control and utterly destroys her gifted, good-natured husband. Love is the man's misfortune and the false woman's lure. Even a mother's love is under suspicion and dangerous to the child, because it is so blindly selfish. Hatred and the thrill of agony rise beyond all limits. The wild symbolism at the close, with the husband in a straight-jacket, is harrowing. The depth of hatred and indignation makes one stand aghast. The shriek of agony shows the deep wounds of suffering which caused it. 'The Comrades' (1888), a sort of sequel to 'The Father,' is pale in comparison.

G. C. J. Bothne.

FATHER JOHN, or FATHER-OF-SICKLE, translations of Arabic names for the common or sacred ibis of the Nile region. See Ibis.

FATHER PROUT. See Mahony, Francis.

FATHERLASHER, a small, ugly, cottoid fish, or bull-head (*Cottus bubalis*), from 8 to 10 inches in length. The head is large, and is furnished with several formidable spines. The fish is found on rocky coasts on both shores of the North Atlantic. On the Labrador coast it attains a large size, and is a considerable article of food.

FATHERS, Apostolic, the six fathers of the Church who were the contemporaries or immediate followers of the Apostles. They are Saints Barnabas, Clemens Romæ, Ignatius, Hermas, Papias and Polycarp.

FATHERS AND CHILDREN (Otsui i Dyéti). The epithet "Nihilist" as a theological term dates back to a hoary antiquity; Turgénief made it the synoym of revolutionist, though, oddly enough, the hero of his most successful novel, 'Fathers and Sons,' is not even by a hint connected with politics. It was quickly seized on, however, and applied particularly to the party that advocated assassination and other violent methods of combating Russian tyranny. 'Otsui i Dyéti' (literally 'Fathers and Children') was published in 1862 in the *Russky Vyestnik* and immediately became the storm centre of passionate and bitter recrimination. It coincided with the first upheaval caused by the emancipation of the serfs and the uncertain beginning of a new era. It is meant to contrast one generation with its successor. Both Fathers and their Sons regarded the characters portrayed as satirical caricatures. The action of 'Fathers and Sons' takes place mainly at the country estate of Nikolai Petróvitch Kirsánof, who had made an unambitious but happy marriage and on the death of his wife had entered into illicit relations with the daughter of his housekeeper. Under the same roof with him lives his younger brother, Pavel Petróvitch, who had engaged in an unfortunate love-affair with the notorious Princess X and, disillusioned, had retired, henceforth to occupy himself with keeping his toilet immaculate, occasionally helping Nikolai Petróvitch regulate his affairs. Kirsánof's son, Arkády, who had been graduated from the University of Petersburg, comes home to make a visit and brings his friend, Bazárof, a Nihilist — a Nihilist, according to Arkády, being a man who bows to no authority, takes no principle on faith, no matter how absolutely bolstered with convention it may be. Bazárof is brutally frank, and this seems to endear him to women and to those below him in station; but his lack of tact renders him particularly obnoxious to Pavel Petróvitch, who, discovering that he is becoming too intimate with his brother's mistress, challenges him but is himself wounded. Bazárof returns to his father's humble estate, and while engaged in scientific investigation of typhus, accidentally becomes infected and dies. The description of his final illness is a remarkable piece of realism; and the portraits of Bazárof's father and mother, the one a rather ridiculous sentimental doctor, the other a superstitious kindly lady of the petty aristocracy, are sympathetic but rather satirical. Other episodes take place at the provincial capital, where Turgénief is cruel in his satire of the conceited rural tchinovnik or official, and at the beautiful estate of the widow, Anna Sergéyevna Odintsova, with whom both Arkády and Bazárof fall in love. Arkády finally transfers his affections to her naive young sister Katherina and marries her, while at same time his father at the intercession of Pavel Petróvitch ends his illicit relations with Fénitchka and legitimatizes their child. There are other notable figures: the silly widow, Madame Kukshina, with pretensions to liberal views and general culture; Viktór Sítnikof, who pretends to be a disciple of Bazárof but is depicted as an ass; Matvyii Ilyitch Kolyázin, a relative of Kirsánof's; a tchinovnik who likes to pose and needlessly to browbeat his subordinates; various princes and princesses, whom Turgénief, like all untitled Russians of ancient family, despised; the priest Father Aleksyei, and the usual representatives of the peasantry, whom Turgénief always loved, though he was not blind to their faults.

There are several English translations of 'Fathers and Sons.' Eugene Schuyler made the first, in 1867; another by an anonymous translator appeared in New York in 1883, under the title 'Fathers and Children'; another, 'Father and Sons,' appeared in Turgénief's 'Works' in London in 1889; also by Mrs. Constance Garnett ('Complete Works,' London 1894-99); another by Miss Isabel Hapgood in 1903. From these a fairly good idea of the novel may be obtained but not one of them is representative of Turgénief's beautiful style.

NATHAN HASKELL DOLE.

FATHERS OF THE CHURCH, a title bestowed upon certain Church writers who stand pre-eminent as authorities in the interpretation of Scriptures, the ritual practice of the age they lived in and the formulation of doctrine as accepted dogma. They represent the main stream of Christian tradition and belief at the period when the teaching of the Apostles was being crystallized into creeds and dogmas. Authority is weightiest in the Apostolic Fathers (q.v.). Next come the Fathers of the Greek Church, such as Athanasius, Basil the Great, Gregory Nazianzen, and John Chrysostom. Parallel with these are Fathers of the Latin Church, among whom are Jerome, Ambrose, Augustine and Gregory the Great. While these are the most important of the Fathers, the term is employed with some looseness and often made to include Greek writers like Origen, and Latin writers like Tertullian, whose speculations are sometimes charged with being unorthodox. In modern times, when the study of Christian doctrine has a tendency to become largely historical, the value of the patristic monuments is esteemed more highly than ever before.

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FATHERS OF MARY. See ORDERS, RELIGIOUS — MARISTS.

FATHIPUR, FATEHPUR, or FUTTEHPUR, British India, capital of the district of the same name, on the highway between Delhi and Calcutta, 70 miles northwest of Allahabad. It contains government buildings and tombs and a mosque of great historic interest. It is noted for its whips. It was the scene of a massacre of Europeans during the mutiny in 1857. Pop. (1911) 16,939. The district (area 1,618 square miles) forms part of the Doab, or great alluvial tract between the Jumna and the Ganges.

FATHOM. See WEIGHTS AND MEASURES.

FATIGUE. A term common both to physiology and to psychology. In the former, fatigue may provisionally be defined as a certain change in function of muscle, nerve or gland resulting from continued stimulation. In psychology two usages of the term are to be distinguished; qualitatively, fatigue is that perceptual experience which we have when we «feel tired»; functionally, it is an explanatory term to account for the decrement in amount and quality of work done by an organism. Whether these three points of view are really three aspects of one and the same thing is a question which cannot now be satisfactorily answered. We shall do well, therefore, to regard them separately and then correlate where, in the light of present knowledge, correlation is possible.

We begin with physiological fatigue. If an extirpated muscle is successively stimulated at regular intervals by electric shocks, and the resulting contractions recorded graphically, then it appears that the contractions at first increase and then decrease more or less regularly in extent until ultimately they may cease entirely. A similar curve may be obtained from living muscle by means of the ergograph, an instrument in which the flexor muscle of the middle finger is made to lift successively a small weight. In both cases the gradual reduction in contractility is known as fatigue, and the complete loss as exhaustion. Both fatigue and exhaustion are, however, relative terms; if, for example, the interval between shocks is long enough then fatigue does not appear, and if after exhaustion stimulation ceases and the muscle is allowed to rest, then it regains, to some extent at least, its contractility. The cause of muscular fatigue is two-fold: In active muscle, certain «fatigue substances,» lactic acid, carbon dioxide and acid potassium phosphate, are produced which tend to inhibit contraction. Secondly, processes of dissimilation and assimilation are constantly going on, the fats and even the substance of the muscle itself are being consumed and replaced. When the processes of dissimilation are more rapid than those of assimilation, then the muscle must ultimately cease to function and exhaustion appears. An interval of rest, on the other hand, gives the blood time to remove the fatigue substances and the processes of assimilation to make repairs.

Nervous tissue seems for the most part to resist fatigue. It is true that the appearance of some nerve cells changes with continued activity; there is first an increase and then a decrease in size and color of cell and nucleus, but this change seems to have no functional significance. Nerve fibres, apparently, also resist fatigue, i.e., impulses will continue to pass over a nerve, that has been stimulated, for several hours. There is, however, a point in the neuro-muscular chain known as the motor end-plate, the point where the motor nerve is attached to the muscle, that according to some investigators is more easily fatigued than the muscle itself. Structurally, this end-plate is a bed of granular protoplasm through which are distributed a number of small nerve fibrils, and it is supposed that the fatigue substances cause these fibrils to contract and thereby to block the conduction of the nervous impulse. It is also held by some physiologists that the synapse, the point of junction between two neurones, is fatigable; the matter is still debated, however, and awaits further experimentation.

We turn to the first of the two psychological points of view. Ordinarily, fatigue as a sensory experience or a «feeling» is not distinguished from weariness, tiredness, jadedness, ennui and the like. There is, however, a typical fatigue which is not the same as the weariness of ennui, that is the mere disinclination to exert one's self, and which is simpler in character than the general lassitude of physical weakness or of long continued exertion. This simple fatigue may easily be induced by the ergograph experiment or by alternately extending and flexing the weighted arm. Under these conditions fatigue appears first as a dragging pressure localized in the muscle and qualitatively identical with muscular sensation. Later it becomes a sense-feeling usually but not always unpleasant, and at high intensities the sensory component is an achy pain. There can be little doubt of the correlation of this typical fatigue with the fatigue of physiology, but the specific nature of the correlation is, at present, unknown.

There remains the point of view of functional psychology. From this aspect, fatigue is commonly regarded as a process which interferes with the efficiency of an organism in its continuous response to a particular situation. It is important to note that the organism is now functioning both physiologically and psychologically, i.e., as a whole, and the response is any prolonged activity whether physical or mental.

In the interest of highest efficiency, numerous attempts have been made to measure the amount of fatigue. The purpose has been not only to forestall serious injury to the organism from overwork, but also to alternate periods of work and periods of rest in such fashion that the largest amount commensurate with the best quality of output might be accomplished. The attempts at measurement have been based upon (1) a distinction between physical and mental work, and (2) certain physiological and mental processes which are regarded as symptoms. Since, however, the organism is functioning as a whole, it must not be supposed that physical fatigue is induced solely by muscular, and mental fatigue by mental effort. On the contrary, the difference is principally a matter of form of activity, and consequently some symptoms such as the feeling of fatigue and decrement in quantity and quality of work are common to both forms of fatigue. In physical fatigue there is a more constant relation between its degree and the reduction of output, and for this reason its measurement may be made most easily and directly by the measurement of the loss of efficiency. In the case of mental fatigue, on the other hand, the problem is much more complex and the experimental attempts to measure it cover a period of two and a half decades. The mental symptoms such as the feeling of fatigue, blocking of associations and fluctuation of attention were early disregarded as unreliable because they do not appear under strong emotion, and they disappear under the influence of stimulants. Recourse was then had to the impairment of physical or mental efficiency. It was thought, for example, that we might measure objectively the amount of fatigue by the loss of physical ability in terms of the scale of the ergograph or dynamometer; or by the decrease in sensitivity as measured by the æsthesiometer; or, again, by the relative number of errors and total time consumed in the solution of some test introduced in the course of a period of mental activity; or, finally, that we might assume as an index of mental fatigue the decrement in quality and quantity of the fatiguing work itself. All of these methods have, in fact, been tried and no one found to be fully satisfactory; the curve of fatigue thus obtained is rarely found to coincide with the curve of physiological fatigue. The investigations themselves, however, have revealed the cause; other factors than fatigue determine the course of efficiency. Of these, practice and habituation are, perhaps, the most important; the former means less expenditure of energy, the latter freedom from worry and from ideas foreign to the task in hand. It has also been found that there may be a “warming up” period before the work gets into full “swing,” and that, later, when the amount of work begins to decrease, a sudden “spurt” may appear because of some novelty in the task or because its end is foreseen. Moreover such factors as competition, hope of reward and fear of penalty, encouragement and persuasion may stimulate the individual in such fashion as to mask the course of fatigue and to maintain efficiency until exhaustion begins. Finally, the course of efficiency is conditioned, in part at least, by the great physiological rhythms. It has been found, for example, that the curve of diurnal mental efficiency rises during the morning hours and reaches a maximum about 11 o'clock, it then falls during the noon hours, rises during the early, and falls again during the late afternoon hours. These fluctuations are not necessarily the result of fatigue. On the contrary, they seem to be matters of habit; the organism is not accustomed to doing mental work early in the morning and at noon. Normal sleep is another intercurrent rhythm which is not now, as formerly, thought to be due to fatigue. In view of these facts we must regard true fatigue not as absolute but as relative — relative to the external and internal stimuli, to the competition of associative paths in the nervous system, to intercurrent rhythms, etc. Whether we shall be able ultimately to separate true fatigue from all other factors which condition maximum efficiency, and thus arrive at a measure or index of fatigue, is a question which can only be answered by further investigation.

Assuming that true functional fatigue is correlated with qualitative and physiological fatigue, the following conclusions seem probable: (1) Since the fatigue substances are dissolved in the blood and distributed throughout the body, fatigue tends to be general and not restricted to some particular locality; it is wrong to suppose, therefore, that more than local relief is afforded by change from one form of muscular work to another. (2) Physical and mental fatigue are inherently the same; rest from mental fatigue cannot, then, be gained by physical exertion. (3) Sleep is the best restorer because it furnishes the best conditions for the removal of fatigue substances and for the processes of assimilation. (4) In the ordinary course of our daily lives we may trust the mental symptoms as the most adequate indicators of the degree of fatigue which we now know.

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FATIGUE, Industrial. See Industrial Fatigue.

FATIGUE OF MATERIALS. See Strength of Materials.

FATIGUE UNIFORM. See Uniform, Military.

FATIMA, fä-tē-mä, (1) The favorite daughter of Mohammed: b. Mecca, Arabia, about 606; d. Medina, Arabia, 632. She had three sons, Al-Hasan, Al-Husein and Al-Muhsin. From the first two were descended the Saiyides. (2) In ‘Alladin,’ the enchantress. (3) In the story of ‘Bluebeard’ the last wife, and the only one not murdered.

FATIMIDES, fat'i-mīdz, or **FATIMITES,** fat'i-mīts (named from Fatima, the daughter of Mohammed and wife of Ali, from whom the founder of the dynasty described in the definition professed to have sprung), a race of Mohammedan kings, whose founder was Abu Abdallah Husein. They were Shütes of the Ismailian sect. Obeid Allah (909–33), subdued northern Africa from the Atlantic Coast to Egypt, assumed the title Mahdi (“Leader of the Faithful”), established his capital at Mahadi and made himself independent of the Abbassid caliphs. The most important of the dynasty was Al-Mu'izz (955–78), who conquered Sicily and Egypt (972), transferred his court to the latter country and founded Cairo. Al-Hakim (996–1021) persecuted Jews and Christians and destroyed the church of the Resurrection at Jerusalem (1009). His cruelties were a leading cause of the Crusades (q.v.). The dynasty included 14 caliphs, of whom Al-Adhid was the last (1171). Consult Wüstenfeld, 'Geschichte der Fatimiden-Khalifen' (1881); Lane-Poole, S., 'History of Egypt' (1905).

FATS. In chemistry, this class of substances was originally understood to include all those compounds of carbon, hydrogen and oxygen which leave a permanent, translucent grease-spot upon paper. In more recent times, however, it has been the custom to include only such bodies of this sort as admit of saponification. They are odorless, colorless, tasteless, white or yellowish, insoluble in water, but soluble in ether, chloroform and benzol. Our knowledge of the constitution of the fats is due in large measure to the labors of the French chemist Chevreul, who showed that they are mostly composed of ~~glycerin, in combination with certain organic acids, known as the fatty acids (q.v.), prominent among which are oleic, stearic and palmitic acids.~~ Fats may be extracted from animal tissues simply by heat, a temperature of 212° F. being generally sufficient. From seeds and other vegetable substances in which they occur they are commonly extracted by heating the ground-up tissues and subjecting them to heavy pressure. As obtained by these methods, the fats often retain fragments of the original tissues in which they occur, as well as certain nitrogenous substances that come away with them. The nitrogenous matters may be removed by shaking the fluid fat (or oil) with sulphuric acid, and the fat may be separated from the fragments of tissue by dissolving in ether, carbon disulphid, benzene or light petroleum and subsequently filtering the solution and recovering the fat by the evaporation of the solvent. The membranous particles that come away with the animal fats may also be removed by treating the fats with very dilute hydrochloric acid, which dissolves the membranous matter while leaving the fat unaltered.

Glyceryl salts of fatty acids

The fats are decomposed when heated to 400° F., by the separation of their glycerin from the fatty acids with which it is combined. They may also be decomposed by saponification — that is, by boiling them with aqueous solutions of the alkalis,— the decomposition, in this case, being due to the replacement of the combined glycerin by the alkali. The glycerin is thereby set free and the resulting compounds of the alkali with the organic acids of the fats are known as soaps, (See SOAP). The rancidity that develops in fats when they are kept for some time is due to the formation or liberation of certain volatile fatty acids and it may be removed by boiling the fat with water (in which case the objectionable acids are volatilized), or by treating it with an aqueous solution of sodium carbonate (in which case the volatile acids are neutralized by the alkali, with the formation of their unobjectionable sodium salts).

As has been noted above, stearic, oleic and palmitic acids are the commonest of the acids that occur in fats. Their compounds (or "esters") with glycerin are known, respectively, as stearins, oleins and palmitins and are markedly similar in their general properties. The nature of these compounds may be sufficiently illustrated by taking stearin as an example. The formula of stearic acid is $H.C_{18}H_{35}O_2$ and that of glycerin is $C_3H_5(OH)_3$. If the two are heated together, they may combine in the following manner: $C_3H_5(OH)_3 + H.C_{18}H_{35}O_2 = C_3H_5(OH)_2.(C_{18}H_{35}O_2) + H_2O$, in which case the compound that is formed is known as "monostearin," or they may combine in this manner; $C_3H_5(OH)_3 + 2H.C_{18}H_{35}O_2 = C_3H_5(OH).(C_{18}H_{35}O_2)_2 + 2H_2O$, in which case the compound formed is known as "distearin" or, finally, they may combine thus: $C_3H_5(OH)_3 + 3H.C_{18}H_{35}O_2 = C_3H_5.(C_{18}H_{35}O_2)_3 + 3H_2O$. in which case the compound is called "tristearin." Similar reactions occur with oleic and palmitic acids. The compounds of these three acids that occur most commonly in fats are tristearin, triolein and tripalmitin.

Fats are classified in industrial chemistry by their saponification values or their iodine values. The saponification value of a fat is determined by the number of milligrammes of caustic potash that are neutralized by the total fatty acid content of one gramme of the fat, during the saponification. The natural fats, being made up of combinations of several esters, have saponification values which are the resultant of the combinations. Thus butter is rated as 220 to 233; lard and tallow at about 195. The high saponification value of butter depends on its content of butyrin, which when pure has a saponification value of 557.3. The palmitin component of lard is rated at 208.8 and its stearin component at 189.1. The saponification value of lard is about 176.

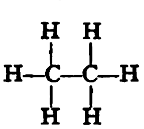
The iodine value gives the amount of halogen estimated as iodine that the unsaturated fatty acids will take up. It is expressed in a percentage of molecular weight of the fat. For example, triolein (M. W. 884) will absorb six atoms of iodine (6 × 127 = 762) or 86.2 per cent of 884. Hence its iodine value is given as 86.2. Iodine values range from about nine for cocoanut oil to 200 for linseed oil. The iodine value of tallow is about 38; of cacao butter about 40; of lard, from 48 to 64; of cod-liver oil about 160. (See FATTY COMPOUNDS). Consult Leathes, J. B., 'The Fats' (London 1913); Lewkowitsch, J., 'Chemical Technology and Analysis of Oils, Fats and Waxes' (London 1913); Wright, C. R. A., 'Animal and Vegetable Fixed Oils, Fats, Butters and Waxes' (London 1903).

FATSHAN. See FU-SHAN.

FATTORI, fạt'tō'rē, **Giovanni,** Italian painter: b. Livorno, 1828. He studied under Guiseppe Bezzuoli and at the Academy of Florence. His 'Battle of Magenta' (1859) was so successful that thereafter he devoted himself to military subjects. He became professor at the Academy of Florence in 1877 and was also elected member of the Academy of Bologna. His noteworthy works include 'The Forty-ninth Regiment at Custozza,' in the National Gallery, Rome; 'The Wounding of Prince Amadeo at Custozza,' in Milan; 'The Horse Fair in the Piazza Montanara, Rome'; 'The Horse Fair of Terracina.' He was awarded medals at Paris in 1900 and also at Vienna and Philadelphia.

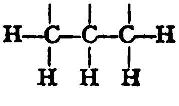
FATTY ACIDS, a large group of monobasic acids arising from the oxidation of the primary alcohols or aldehydes, and having the general formula $C_n H_{2n} O_2$. When a fat is heated in combination with a stronger base than glycerin, such as potash or soda, the fatty acids leave their combination with the glycerin and combine with the metallic base, thus forming soap. The fatty acids most commonly found in nature are formic acid, in ants, some caterpillars and the stinging nettles; cerotic acid, in beeswax; butyric acid in butter and in the perspiration; stearic acid, in the fat of animals; and acetic acid, in odoriferous vegetable oils. The higher members of the group combine with glycerol to form the glycerides and constitute the larger part of the principal animal and vegetable fats, oils and waxes. The lower members of the group — formic acid, acetic acid, propionic acid, etc.,— are volatile liquids which mix readily in all proportions with alcohol and ether. As the number of the carbon atoms increases, the higher members of the group exhibit oily and viscid characteristics and are less soluble in water. Nanthylic acid is not soluble in water. Capric acid and lauric acid are solids. The fatty acids are generally prepared by the oxidation of the primary alcohols or aldehydes, or by decomposing the unsaturated acids with caustic alkali. See FATTY COMPOUNDS.

FATTY COMPOUNDS, or ALIPHATIC COMPOUNDS, in organic chemistry, are those compounds whose molecules do not include a closed chain of carbon atoms, as distinguished from the Aromatic Compounds in which this closed chain does obtain. (See AROMATIC COMPOUNDS). The name «fatty» no longer implies any necessary relation to the fats, but it was originally given to the group because many of its earliest-known representatives occur in the animal or vegetable fats, or are related to them in a simple manner. The name «methane compounds» has also been proposed for the group, but it has not been generally adopted, although it is a particularly happy designation, since all of the compounds of the group are theoretically derivable from methane, CH_4, by addition or substitution. Generally they are grouped, particularly in works on chemistry, under the title «Hydrocarbons.» The fatty compounds may be subdivided, in a general way, into those that are «saturated» and those that are «unsaturated.» Saturated compounds are those in which the atomic linkage is such that no more atoms can be attached to the carbon chain of the molecule without causing it to split; and unsaturated compounds are those in which this condition is not fulfilled. For example, ethane, C_2H_6, has the structural formula:



$$\begin{array}{ccccccc} & & H & & H & & \\ & & | & & | & & \\ H & - & C & - & C & - & H \\ & & | & & | & & \\ & & H & & H & & \end{array}$$

and it is therefore a saturated compound, because there is obviously no way to introduce more atoms without separating the carbon atoms or removing one or more of the hydrogen atoms. If we introduce (say) the group CH_2 («methene»), we must place it between the two carbon atoms, or between a carbon atom and one of the hydrogen atoms now attached to it. In either case the structural formula of the resulting compound (known as «propane,» C_3H_8) is



$$\begin{array}{ccccccccc} & & H & & H & & H & & \\ & & | & & | & & | & & \\ H & - & C & - & C & - & C & - & H \\ & & | & & | & & | & & \\ & & H & & H & & H & & \end{array}$$

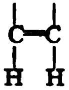
so that the new compound is also saturated. By continued additions of CH_2, butane and pentane are formed. Compounds of such simple structure are termed «normal compounds,» but the same composition may be developed in a different structure, or, as it is called, a «branched chain,» and these are termed «isomers» (see ISOMERISM), such as CH_3 (methyl), C_2H_5 (ethyl), C_3H_7 (propyl), etc. Theoretically, a very large number of such compounds are possible, and those containing up to 60 atoms of carbon in the molecule have already been recognized.

The majority of the saturated hydrocarbons are natural substances. The lower members of the series — those containing up to four atoms of carbon — are gases; they are produced during the dry distillation of many organic substances, as in making coal gas. They are also produced in the processes of digestion in animals. The middle members of the series — those containing from 5 to 16 carbon atoms — are liquids, and are found naturally in crude petroleum, which consists of a mixture of saturated hydrocarbons. The higher members of the series are solids, as the natural mineral wax ozokerite and paraffin wax.

The saturated hydrocarbons have a peculiar odor. They are soluble in alcohol and ether, but not in water. They are all inflammable to a greater or less degree. The gaseous members ignite readily and burn with a non-luminous flame. Mixed with air they form explosive compounds. The liquid members in some cases ignite readily, in others after being heated, they burn with a more or less luminous flame. The solids burn with the aid of a wick, with a highly-luminous flame.

The unsaturated hydrocarbons are so-called because, as they contain less hydrogen in the molecule, the four valencies of the carbon atom are not satisfied by the hydrogen atoms. The unsaturated hydrocarbons bear the terminations *ene* and *ine,* as ethene (ethylene) and ethine (acetylene).

Ethylene (q.v.), C_2H_4 is an unsaturated compound because a carbon nucleus containing two atoms of carbon is capable of fixing six atoms of hydrogen, as appears in the first of the foregoing structural formulæ. It is, therefore, usual to consider that in this case two valencies in the carbon nucleus satisfy each other, so that the structural formula for ethylene is



$$\begin{array}{ccc} H & & H \\ | & & | \\ C & = & C \\ | & & | \\ H & & H \end{array}$$

Here it is obviously possible to introduce two additional monad atoms or radicals, by breaking one of the two valencies uniting the carbon atoms, and attaching one of the monad atoms so introduced to each of the free ends of the valency so broken; the carbon atoms remaining constantly united by *one* of the bonds. If a pair of hydrogen atoms be introduced in this way, ethane is produced, as will be seen by inspecting the structural formula of that substance, given above. In acetylene (q.v.) C_2H_2, three bonds are commonly assumed to unite the two carbon atoms, so that the structural formula of this substance is $H - C \equiv C - H$. Acetylene, therefore, is an unsaturated compound. Much attention has been paid to the theory of these double and triple bonds between adjacent carbon atoms, and it has been conclusively established (contrary to what might be naturally assumed) that a double or triple linkage between two carbon atoms constitutes a weaker bond than the single linkage. When, for example, an unsaturated compound is broken up by the action of powerful chemical reagents, it is almost invariably the double (or triple) bond that is ruptured. A quantitative study of the heat-energy liberated when compounds of carbon and hydrogen are burned also shows that the force required to break a double or triple bond is smaller than that required to break a single bond.

Although the fatty and aromatic groups of chemical compounds are differentiated so strongly that it is not easy to convert a representative of either group into a representative of the other one, such a transformation is nevertheless possible. Thus Berthelot showed that when acetylene gas is passed through a red-hot tube it is converted into benzene, naphthalene and other members of the aromatic group; and an example of the opposite kind of transformation, in which an aromatic compound is converted into a fatty compound, is afforded by the formation of methyl chloride, CH_3Cl, when hydrochloric acid gas is passed through boiling metaxylene, $C_6H_4(CH_3)_2$. It has been pointed out that there is probably much significance in the fact that the carbohydrates, which are the chief constituents of plants, are fatty compounds containing six (or a multiple of six) atoms of carbon; while the products obtained by the dry distillation of coal (that is, the fossilized remains of such plants), are chiefly aromatic compounds, in which six carbon atoms are united in the form of a «benzene nucleus.» It is likely, in view of this fact, that most of the carbohydrates might be transformed into members of the aromatic group, by the prolonged action of great pressure and moderately high temperature.

Fundamental among the fatty compounds are three series of hydrocarbons, which contain only carbon and hydrogen and are known respectively as the paraffins, the olefines and the acetylene series. The simplest member of the paraffin series is methane («marsh gas»), CH_4, from which the higher members are derived by successive additions of the group CH_2, as has already been illustrated in connection with the derivation of propane from ethane. The paraffins are very numerous, and many of the higher members of the series have been but little studied. As will be seen from their mode of derivation from methane, they all come under the general formula $C_nH_{2n}+_2$, where n may have any value from unity up to a limit which probably exists, but is at present undetermined. Isomeric forms of the paraffins are possible when n is greater than 3, and the number of such possible isomeric forms increases rapidly as the value of n increases. Thus in the case of butane, C_4H_{10}, there can be but one isomer, while the compound $C_{13}H_{28}$, known as tridecane, is theoretically capable of existing in no less than 802 distinct forms. See ISOMERISM.

The olefine series of hydrocarbons begins with ethylene («olefiant gas») C_2H_4, from which the higher members may be regarded as derived, just as before, by successive additions of CH_2. The general formula for the olefine series therefore is C_nH_{2n} and many isomers are known here also. The acetylene series, which has not been so thoroughly studied as the lower paraffins and the olefines, begins with acetylene gas, C_2H_2, and has the general formula C_nH_{2n-2}. See HYDROCARBONS.

Among the derivatives of the fatty hydrocarbons, the fatty alcohols and fatty acids require special mention. Alcohols, as a class, are considered under ALCOHOL. In general, they may be regarded as derived from the hydrocarbons by replacing one or more of the hydrogen atoms by an equal number of molecules of hydroxyl (OH). They are known as «monohydric,» «dihydric,» «trihydric,» etc., according as one, two, three, etc., atoms of hydrogen are replaced in the original hydrocarbon. A vast number of monohydric alcohols are known, but the number of recognized dihydric alcohols (also known as «glycols») is far smaller. Five trihydric fatty alcohols are known, of which glycerin, $C_3H_5(OH)_3$, is the only familiar example; and only one fatty tetrahydric alcohol, erythrite, $C_4H_6(OH)_4$, is known, though a few that are still more highly hydrated have been prepared. The most important series of the monohydric fatty alcohols is that derived from the paraffin series of hydrocarbons, $C_nH_{2n}+_2$, by the substitution of OH for H. The general formula for this series of alcohols therefore is $C_nH_{2n}+_1.(OH)$; it includes methyl alcohol, ethyl alcohol, and, in fact, nearly all of the more familiar alcohols. The monohydric alcohols of the olefine series of hydrocarbons have the general formula $C_nH_{2n-1}.(OH)$, but they include only a single familiar example — allyl alcohol, $C_3H_5.OH$. Those of the acetylene series have the general formula $C_nH_{2n-3}.(OH)$, but they do not include any that are of importance save to the theoretical chemist.

The fatty acids are so called because their higher members occur in the natural fats — which are esters of the fatty acids with glycerin. They are exceedingly numerous, and play a highly important part in the processes of animal and vegetable life. A complete classification of them cannot be here attempted, but three of the known series must be mentioned. The series derived from the paraffins has the general formula $C_nH_{2n}O_2$ and its members may be derived, by oxidation, from the alcohols of the paraffin series that contain the same number of carbon atoms. The best-known examples of this series are as follows:

Formic Acid....................	CH_2O_2
Acetic Acid......................	$C_2H_4O_2$
Propionic Acid..................	$C_3H_6O_2$
Butyric Acid.....................	$C_4H_8O_2$
Capric Acid......................	$C_{10}H_{20}O_2$
Lauric Acid......................	$C_{12}H_{24}O_2$
Palmitic Acid...................	$C_{16}H_{32}O_2$
Stearic Acid.....................	$C_{18}H_{36}O_2$
Melissic Acid...................	$C_{30}H_{60}O_2$

The alcohols corresponding to these acids have not all been prepared, but many of them have been and the chemical deportment of the remaining members of the group leaves no doubt of their relation with the normal paraffins from which they are assumed to be derived. All of the foregoing acids are monobasic, containing but one atom of replaceable hydrogen; and these acids, together with the others that belong in the same series, are the ones to which the name "fatty acids" is often applied, by writers on chemistry, to the exclusion of all other organic acids. According to the definition of "fatty compounds" adopted above, however, all organic acids that do not contain closed carbon chains would appear to be logically included under this title.

Two important series of acids are derived, by oxidation, from dihydric alcohols, or "glycols," of the paraffin series. The general formula for these glycols being $C_nH_{2n}(OH)_2$, the lactic acid series of acids is obtained from them by an oxidation which consists in the replacement of two atoms of hydrogen by one atom of oxygen. The general formula of the lactic acid series therefore is $C_nH_{2n}O_3$. Its most important members are as follows:

Carbonic Acid	CH_2O_3
Glycollic Acid	$C_2H_4O_3$
Lactic Acid	$C_3H_6O_3$
Hydroxybutyric Acid	$C_4H_8O_3$
Hydroxyvaleric Acid	$C_5H_{10}O_3$
Leucic Acid	$C_6H_{12}O_3$

Carbonic acid is included in this list on the hypothesis that it exists in aqueous solutions of the gas in the form $CO_2 + H_2O$. Except for carbonic acid, all the acids of the foregoing list are monobasic. For the reason why carbonic acid is not also monobasic, reference must be made to the more extended treatises on organic chemistry.

The oxalic acid series is derived from the glycol series, given above, by an oxidation which consists in the substitution of two atoms of oxygen for four of hydrogen. The general formula for this series of acids therefore is $C_nH_{2n-2}O_4$. The most important representatives are:

Oxalic Acid	$C_2H_2O_4$
Malonic Acid	$C_3H_4O_4$
Succinic Acid	$C_4H_6O_4$
Pyrotartaric Acid	$C_5H_8O_4$
Adipic Acid	$C_6H_{10}O_4$
Azaleic Acid	$C_9H_{16}O_4$
Sebacic Acid	$C_{10}H_{18}O_4$

The foregoing acids are all dibasic.

The carbohydrates constitute a large and important class of open-chain (or fatty) compounds. They all contain carbon, hydrogen and oxygen and are called "carbohydrates" because, like water, they contain precisely twice as many atoms of hydrogen as of oxygen and can therefore be regarded as consisting merely of water and carbon. (See CARBOHYDRATES.) The carbohydrates are more commonly divided simply into (1) glucoses (or hexoses); (2) saccharoses; and (3) amyloses. The glucoses comprise glucose (or dextrose), fructose (or levulose), galactose and sorbose (or sorbinose); and they all have the empiric formula $C_6H_{12}O_6$. The saccharoses include cane-sugar, lactose, melezitose and maltose; they all have the empiric formula $C_{12}H_{22}O_{11}$, and are all derived by the union of two molecules of a glucose, with the elimination of one molecule of water. Their general formula may therefore be written $(C_6H_{11}O_5)_2O$, and they may be regarded as related to the glucoses in the same way that ether is related to alcohol. The amyloses include starch, glycogen, dextrin, cellulose, inulin and the gums. They have the general empiric formula $(C_6H_{10}O_5)_n$. (See also, in this encyclopedia, ALCOHOL; CARBON COMPOUNDS; HYDROCARBONS; ISOMERISM; SUGARS; and many other titles). Consult Cohen, J. B., 'Organic Chemistry for Advanced Students' (New York 1909–13); Pope, F. G., 'Modern Researches in Organic Chemistry' (London 1912); Remsen, I., 'An Introduction to the Study of the Compounds of Carbon' (Boston 1908); Richter, V. von, 'Organic Chemistry, Vol I, Chemistry of the Aliphatic Series' (Spielmann trans., Philadelphia 1916); Stewart, A. W., 'Recent Advances in Organic Chemistry' (New York 1908).

FATTY DEGENERATION. See DEGENERATION; PATHOLOGY.

FATUITY, in present usage, synonymous with idiocy (q.v.). Foolishness or weakness of mind.

FATWA, fut'wä, India, village in Patna district of Bengal, seven miles from Patna city, at the junction of the Punpun with the Ganges. Fatwa is a place of great sanctity to Hindus. It is on the East Indian Railroad, and has woolen and linen manufactures. Pop. about 1,000.

FAUBOURG, fō'boor', French name for a portion of a town or city without the walls, hence a suburb. Many faubourgs are now included within the city limits, e.g., Faubourg Saint Germain, now a part of Paris. The word is derived from the old French, *Forbourg*, from *fors, hors*, outside (Lat. *foris*) and bourg (Lat. *burgus*), borough.

FAUCES, faw'sēz, in anatomy, the hinder part of the mouth, leading to the pharynx. In ancient architecture, narrow passages on both sides of the tablinum, and leading from the atrium to the peristylar court.

FAUCHE-BOREL, fōsh-bô'rĕl, **Louis,** French Bourbon agent: b. Neuchâtel, 1762; d. 1829. He became a printer and was for some time settled as a publisher at Strassburg, whither he repaired to treat with Pichegru for the restoration of the Bourbons. In 1795 the Directoire ordered his arrest, but there being little or no evidence brought forth against him, he was released. After the defection of Pichegru he continued to treat with Barras, but his activity for the restoration of the monarchy becoming known he was banished from France. He spent eight years in England and Sweden and returned to France in 1814 with the allied armies. He was for a time Prussian consul-general at Neuchâtel. He was neglected by his Bourbon masters after the Restoration and it was not until Charles X ascended the throne that he received the tardy recognition of a pension of 5,000 francs. Consult his 'Mémoires' edited by Beauchamp (4 vols., Paris 1828–29); Barbey, 'Les Mémoires de Fauche-Borel' (in *Revue Historique*, Vol. CI, pp. 326–333, ib. 1909).

FAUCHER, fō'shā, **Julius,** German economist and free trader: b. Berlin, 1820; d. Rome 1878. He was a descendant of a French Huguenot family and was educated in the city of his birth. He was a follower of Adam Smith and embraced the doctrine of the English Free-trade party. In Berlin, in 1846, he founded the first German free-trade society, later known as the Economic Society of Berlin. He founded the *Abendpost* at Berlin in 1850, the first free-trade journal in the country. Within a few years it was suppressed by the authorities and Faucher removed to England, where he joined the staff of the *Morning Star*. In 1861 he was back in Germany advocating strenuously for the liberty of domicile, free trade and freedom in industry. He was chosen member of the Prussian Diet and in 1863, with Michaelis, founded the *Vierteljahrsschrift für Volkswirtschaft, Politik, und Kulturgeschichte*. During the Franco-Prussian War he was correspondent of the London *Daily News* with the German armies. He published, in addition to his articles in the periodicals mentioned above, 'Ein Winter in Italien, Griechenland und Konstantinople' (1876); 'Vergleichende Kulturbilder aus den vier europäischen Millionenstädten' (1877); 'Streifzüge durch die Küsten und Inseln des Archipels und des ionischen Meeres' (1878); 'Russian Agrarian Legislation of 1861' (in 'System of Land Tenure in Various Countries,' 3d ed., London 1881).

FAUCHER, Léonard Joseph (Léon), French economist: b. Limoges, 8 Sept. 1803; d. Marseilles, 14 Dec. 1854. His family removed to Toulouse in 1812 and four years later his parents were separated. In those trying years Léon helped support himself and his mother by designing embroidery, the while attending to his studies. He became private tutor in Paris, and managed to pursue his studies in history and archæology. In 1830 he became active as a Liberal in journalism. In 1830–33 he was on the staff of the *Temps* and for a time was editor of *Le Constitutionel*. He launched a journal of his own, *Le Bien public*, but it turned out a failure. In 1834 he joined the *Courier français* and was its editor from 1839 to 1842. About this time he began to give his attention to economic questions; advocated a customs union between the Latin races to offset the Teutonic Zollverein, also propounding a free trade policy, in which connection he visited England in 1843 to study the system there. In 1847 he was sent from Rheims to the Chambre as an advocate of free trade. After 1848 he was a member of the Constituent Assembly, where he opposed several popular measures chiefly because they were sponsored by the Republicans. Under Louis Napoleon he was successively Minister of Public Works and Minister of the Interior, but in 1849 his attempt to influence the approaching elections compelled his resignation. In 1851 he was again Minister of the Interior. After Napoleon's *coup d'état* he retired from politics and went to Italy to restore his shattered health. He died while returning to Paris. Consult 'Mélanges d'économie politique et de finance' (2 vols., 1856), and 'Léon Faucher, biographie et correspondence' (2 vols., 2d ed., Paris 1875).

FAUCIGNY, fō-sē-nyē', a district of France, department of Haute Savoie; area, about 840 square miles. Belongs almost wholly to the basin of the Arve, and not more than one-third of its surface is fit for culture. Pop. 102,000.

FAUCIT, fâ'sit, **Helen** (**Lady Martin**), English actress: b. London, England, 11 Oct. 1817; d. Wales, 31 Oct. 1898. In 1851 she was married to Theodore (afterward Sir Theodore) Martin (q.v.). She made her professional début as Julia in the 'Hunchback' at Covent Garden in January 1836. She was at once successful, took a leading part in Macready's Shakespearean revivals, in the first representation of Lytton's plays, and in Browning's 'Blot in the Scutcheon' and 'Strafford.' As an interpreter of Shakespeare's heroines, Juliet, Rosalind, Portia, Beatrice, Imogen, Cordelia and Lady Macbeth, she stood first among the actresses of her time. Some years after her marriage she left the stage, appearing only at rare intervals for public or charitable purposes, as in Beatrice at the opening of the Shakespeare Memorial Theatre at Stratford. In 1885 she published a volume of delightful studies, entitled 'On Some of Shakespeare's Female Characters.' Her 'Life,' by her husband, appeared in 1900.

FAUJAS DE SAINT-FOND, fō'zhạ' de san'-fôṅ', **Barthélemy,** French geologist: b. Montélimart, 17 May 1741; d. 18 July 1819. He received his education at the Jesuit College of Lyons, studied law at Grenoble and was admitted advocate to the Parliament. In 1765 he became president of the Seneschal's Court, but he soon was attracted to outdoor life and the study of geology. On the occasion of his repeated visits to the Alps he studied the forms, structure and composition of rocks and in 1775 discovered a rich vein of pozzuolana in the Velay. Buffon invited him to Paris, where Louis XVI appointed him assistant naturalist at the Museum and in 1788 he became royal commissioner for mines. In the latter capacity he traveled all over Europe and in his 'Recherches sur les volcans éteints du Vivarais et du Velay' he developed his theory of the origin of volcanoes. He was the first to point out the volcanic nature of the basaltic columns in Fingal's Cave, Isle of Staffa. In 1793 he was made professor at the Jardin des Plantes, a post he held until 1818. He wrote 'Voyage en Angleterre, en Écosse et aux Iles Hébrides' (1797; Eng. trans., 2 vols., 1799); 'Description des expériences de la machine aérostatique de MM. Montgolfier' (1784); 'Historie naturelle de la province de Dauphine' (1782); 'Minéralogie des volcans' (1784); 'Essai de géologie' (1809).

FAULHABER, foul'hạ-bėr, **Michael,** German prelate: b. Klosterheidenfeld, Bavaria, 5 March 1869. He was educated at the Schweinfurt gymnasium, and at the gymnasium, university and Kilaneum Seminary of Würzburg. In 1887–88 he was a soldier and non-commissioned officer in the Bavarian army and was ordained to the Catholic priesthood in 1892. In 1892–94 he was chaplain and parish priest and in 1894–96 was prefect of the Kilianeum Seminary, Würzburg. In 1896–99 he was engaged in studying manuscripts at the Vatican and other Italian museums. From 1899 to 1903 he was privatdocent in Greek palæography, Biblical archæology, homiletics, exegesis of the Psalms, at the University of Würzburg, and in 1903–11 was professor of the Old Testament exegesis and introduction to Sacred Scripture at the University of Strassburg. In 1911 Dr. Faulhaber was consecrated bishop of Speyer. In 1900 he visited England to study manuscripts of early Christian literature, spending one semester at Oxford. In 1902 he visited Spain for a

similar purpose. He has published 'Die griechischen Apologeten der klassischen Väterzeit' (1896); 'Die Propheten-Catenen nach römischen Handschriften' (1899); 'Hesychii Hierosolymitani interpretatio Isaiæ prophetæ' (1900); 'Hohelied-Proverbien-und Prediger Catenen' (1902); 'Petrus stirbt nicht (1903); 'Weltkirche und nationale Anstalten' (1906); 'Die Vesperpsalmen, weiteren Kreisen erklärt' (1906); 'Schule und Religion' (1907); 'Soziale Charitas' (1910); 'Priester und Volk und unsere Zeit' (1911; 1912); 'Die heilige Schrift ein Hirtenbrief der sozialem Ordnung' (1911); 'Charakterbilder der biblischen Frauenwelt' (1912). He was a collaborator in Kihn, 'Patrologie'; Karo-Lietzmann, 'Catenarum græcarum catalogus' (1902); Buchberger, 'Kirchliches Handlexigon,' etc. He is a contributor to the *Theologische Quartalschrift, Biblische Zeitschrift, Strassburger Diözesanblatt, Oriens christianus, Monatsschrift für katholische Lehrerinnen, Literarische Rundschau, Theologische Revue*, etc.

FAULKNER, fâk'nėr, **Charles James**, American lawyer: b. Berkeley County, Va., 1805; d. 1 Nov. 1884. He was admitted to the bar in 1829, sat at various times in both houses of the Virginia legislature and was a member of Congress 1851–59. In 1860 he was appointed Minister to France. Returning to the United States in 1861 he was imprisoned on suspicion of disloyalty, in Fort Warren, Boston, but was exchanged the same year. He was sent to Congress from West Virginia 1875–77.

FAULKNER, John Alfred, American theologian; b. Grand Pré, Novia Scotia, 14 July 1857. He was graduated at Acadia College in 1878 and at Drew Theological Seminary in 1881. He also studied at Andover Theological Seminary 1881–82, at the University of Leipzig 1902–03, and the University of Bonn 1904. In 1883 he was ordained to the ministry of the Methodist Episcopal Church and from 1883 to 1897 held successive pastorates at Beach Lake, Yatesville, Scranton, Taylor and Great Bend, Pa., and Binghamton, N. Y. In 1897 he was made professor of the history of theology at Drew Theological Seminary. He has published 'The Methodists' (in 'The Story of the Churches' series, 1903); 'Cyprian, the Churchman' (1906); 'Erasmus, the Scholar' (1908); 'Crises in the Early Church' (1912), also contributions to Hurst's 'History of the Christian Church' (1897–1900), and contributions to encyclopedias and reviews.

FAULKNER'S ISLAND, in Long Island Sound, belonging to Connecticut and about four miles from the mainland. A lighthouse, still in use, was erected here some years ago.

FAULT, *in geology*, any rock-crack or fissure with dislocation of the strata so that one wall of the fracture has slipped past the other wall. The rock movement may accompany the formation of the crack, or may come later and the total movement may vary from a small fraction of a foot to many thousands of feet. Faults are produced by the same strains and stresses which make folds, the rocks breaking instead of bending; a brittle stratum may be faulted, while softer strata above or below may be only bent. The dip of a fault is the amount of inclination of the plane of fracture from the horizontal; the hade or slope is the complement of the dip, being the amount of inclination of the plane from the vertical. Thus the hade of a fault with dip of 60 degrees would be 30 degrees. The rock-strata relatively dropped from the downthrow side; the upthrow side is opposite. In the case of a fault plane that is not verticle, the side of the fracture that overlies the other is the hanging wall; the underlying side is the foot-wall. The trace of the fault plane on the horizontal is its strike. The throw of a fault is the total vertical displacement, the heave is the total horizontal displacement, both measured in a plane normal to the strike. If a fault dips 45 degrees the heave and throw are equal.

Faults are classified as normal and reversed. In a normal fault the hanging wall is on the downthrow side. Such faults are usually produced by gravity, the hanging wall having slipped downward along the fracture. In such faults, the fracture is usually steep and they are often known as gravity faults. In a reversed fault the hanging wall is on the upthrow side, that is, has been thrust up by compression, the beds on one side of the fracture being thrust past those on the other. As a rule thrust faults have lower dips than normal faults, since for the hanging wall to ride up over the other side, the plane of breaking must usually be inclined at a low angle. The best examples of great normal faults in the United States are in the Arizona-Colorado Plateau. Some of these such as the Grand Wash and Hurricane Faults, have vertical displacements of several thousand feet. A few are so recent that the upthrown side stands as a great wall, overlooking the downthrown side. Such a wall is known as a fault escarpment, or more briefly, as a fault scarp. Erosion, of course, ultimately removes all traces of a scarp, but even after that the structure is still called a fault. Horizontal movements also occur in faulting, offsetting roads and fences, as in the famous San Francisco earthquake, the tremor of which was produced by a fault movement. Thrust faults are common in the southern Appalachian Mountains, or in other regions of close compression and intense folding. Such faults are known, in which the plane is nearly horizontal and in which older rocks have been thrust out over younger beds for distances of 15 miles or more. The Lewis overthrust of Montana and the Hart Mountain overthrust of Wyoming are striking examples. Generally a fault-fissure is filled with more or less ground-up material, called breccia, formed from the dislocated strata and the hanging and foot wall faces are grooved and polished, giving the appearance called slickensided.

It is obvious that faults are essentially surface phenomena; for with increasing depth and increasing pressure from above, rocks bend rather than break, and we can easily imagine a depth at which all rocks, while not truly molten, are plastic. See ESCARPMENT; GEOLOGY; MOUNTAIN; ORE DEPOSIT.

FAUN, fân (Lat. *Faunus*, from *favere*, to be favorable to), in Roman mythology, a Latin rural deity. See FAUNUS.

FAUN OF PRAXITELES, a marble statue in the Museo Capitolino, Rome, the copy of a bronze original which stood in a street of Athens. The only animal attributes of the satyr leaning against a tree trunk are the pointed tips of the ears, and is the earliest departure from tradition in this matter. Consult Hawthorne, 'Marble Faun.'

FAUNA, fân'a, the animals native to a special locality, region or period of time, as the term «flora» is used by botanists. The term, when prefixed by certain words, is restricted to a more special usage, as «piscifauna,» the fishes of a certain region; «avifauna,» the birds of a district collectively, etc. Geologists and palæontologists employ the term in a somewhat wider sense, as covering all the animals of a given region, during a geological period — the fossil remains of such animals being found in the successive layers of deposits formed during the entire period in which they lived.

FAUNA, in Roman mythology, a Roman goddess, originally called Marica, but after her marriage with Faunus named Fauna. She is sometimes identified with Cybele.

FAUNCE, Daniel Worcester, American Baptist clergyman: b. Plymouth, Mass., 3 Jan. 1829; d. 1911. He was graduated from Amherst College in 1850 and was ordained to the Baptist ministry in 1853. He held various pastorates in New England and elsewhere, and was a member of the board of managers of the American Baptist Missionary Union. He has published 'The Christian in the World'; 'Words and Works of Jesus' (1873); 'Words and Acts of the Apostles' (1874); 'A Young Man's Difficulties with His Bible' (1877); 'The Resurrection in Nature and Revelation' (1880); 'Prayer as a Theory and a Fact' (1890); 'Hours With a Skeptic'; 'Shall We Believe in a Divine Providence?' (1900); 'The Mature Man's Difficulties with His Bible' (1908).

FAUNCE, John, American naval officer: b. Plymouth, Mass., 25 March 1807; d. Jersey City, N. J., 5 June 1891. He entered the United States marine service as third lieutenant in 1837; in 1858 he was made commander of the revenue steamer *Harriet Lane*, which, under his command, accompanied the naval expedition to Paraguay in 1858–59, and which in 1861 was one of the small fleet that was hastened to the relief of Fort Sumter and was fired on by the Confederates at Charleston.

FAUNCE, William Herbert Perry, American educator: b. Worcester, Mass., 15 Jan. 1859. He is a son of D. W. Faunce (q.v.). He was graduated at Brown University in 1880 and at the Newton Theological Seminary in 1884; held pastorates in Springfield, Mass., 1884–89 and New York 1889–99; was long a trustee of Brown and Rochester universities; lecturer at the University of Chicago 1896–97. He was made president of Brown University in June 1899. He is the author of 'The Educational Ideal in the Ministry' (Lyman Beecher Lectures, 1908); 'What Does Christianity Mean?' (1912); 'Social Aspects of Foreign Missions' (1914). He has received the honorary degree of D.D. from Brown, Yale and Harvard universities, and the degree of LL.D. from Baylor, Alabama, Dartmouth, Wesleyan, Denison and Amherst.

FAUNUS, an Italian divinity, probably an ancient Italian king, who instructed his subjects in agriculture and the management of flocks and was afterward worshiped as the god of fields and of shepherds. The festival of the Faunalia, held on 5 December, referred to the protection he exercised over agriculture and cattle. Fauna was his female complement. He was also worshiped as a prophetic divinity. As deity of the woods and of flocks and herds he corresponds to the Greek Pan, and hence with his name became associated the attributes of the latter. The idea also arose of a plurality of fauns, like the Greek satyrs, who were represented with short horns, pointed ears, tails and goats' feet, and to whom all terrifying sounds and appearances were ascribed. Readers of Hawthorne's 'Marble Faun' will remember the artistic use there made of the conception.

FAUQUE DE JONQUIÈRES, fōk' de zhōn'kē-ăr, **Jean Phillipe Ernest**, French admiral and mathematician: b. Carpentras, department of Vaucluse, France, 3 July 1820; d. 1901. He entered the navy and as chief of staff to Admiral La Grandière in Cochin-China he organized at Saigon the first agricultural and industrial exposition in the French Asiatic possessions. He was appointed vice-admiral 1 Oct. 1879 and in 1883 became director of the Bureau of Charts and Plans. He published several valuable mathematical treatises, including 'Mélanges de géométrie pure' (1856); 'Essai sur la génération des courbes géométriques' (1859); 'Théorèmes fondamentaux sur les séries de courbes et de surfaces algébriques, etc.' (1865); 'Système de courbes et surfaces algébriques d'ordre quelconque' (1866). He also translated into French the 'Epistles' and the 'Art of Poetry' of Horace.

FAUQUIER, fâ'kwėr, **Francis**, American colonial governor: b. about 1704; d. 3 March 1768. He became a director of the South Sea Company in 1751, and succeeded Dinwiddie as lieutenant-governor of Virginia in 1758 and retained the office for the remainder of his life. Upon the passing of Patrick Henry's Stamp Act resolutions he dismissed the Virginia house of burgesses, opposed the Stamp Act Congress and prevented the colony of Virginia from choosing delegates at the invitation of Massachusetts by refusing to issue writs for summoning the house of burgesses.

FAURE, François Félix, frän-swä fā-lēks fōr, French President: b. Paris, 30 Jan. 1841; d. there, 16 Feb. 1899. He was for a time a tanner in Touraine, but became a wealthy shipowner in Havre and an authority on all questions concerning shipping, commerce and the colonies. During the Franco-Prussian War he commanded a body of volunteers and gained the ribbon of the Legion of Honor. He entered the Chamber of Deputies in 1881, served as Colonial Under Secretary and Commercial Minister in the cabinets of Gambetta, Jules Favre and Tirard, and as Minister of Marine in that of Dupuy (1893). A Moderate Republican and chief spokesman of the Union Republicans, he was elected President of the Republic on the resignation of Casimir Périer in 1895. The consummation of the alliance with Russia was the chief event of his term of office. He opposed the reopening of the Dreyfus case.

FAURÉ, fō'rā, **Gabriel Urbain**, French composer: b. Pamiers, 13 May 1845. He studied at the School of Sacred Music under Niedermeyer, Dietsch and Saint-Saëns. In 1877 he was appointed chapel master at the Madeleine and in 1896 became organist there. He was Massanet's successor as professor of composition at the Conservatoire and in 1905 was made director. He was elected to the Academy in 1909. He was twice awarded the Chartier prize for chamber music. He has composed a symphony in D minor, two quartets for piano and strings, a suite for orchestra, sonata for violin and piano, concerto for violin, elegy for violoncello, incidental music for ‘Caligula’ and ‘Shylock,’ a requiem, a cantata, ‘The Birth of Venus,’ and a number of songs. He occupies a foremost place among modern composers, his music possesses remarkable originality and is essentially refined and artistic.

FAURIEL, Claude Charles, clōd shärl fō-rē-el, French historian: b. Saint Etienne, France, 21 Oct. 1772; d. Paris, 15 July 1844. He published ‘History of Southern Gaul under its German Conquerors’ (1836); ‘The Origin of the Epic of the Middle Ages’ (1833); ‘History of Provençal Poetry’ (1846); and ‘Dante and the Origin of the Italian Language and Literature’ (1854), etc.

FAUSBÖLL, fous'bẹl, **Michael Viggo,** Danish philologist: b. Hove, near Lemvig, 1821; d. Copenhagen, 3 June 1908. He was appointed on the staff of the Copenhagen library in 1861 and was made professor of Indo-Oriental languages at the University of Copenhagen 1878. He devoted most of his attention to editing Pali texts. His publications include ‘The Dhammapadam,’ with commentary and translation in Latin (Copenhagen 1855; 2d ed., London 1900); ‘Five Jatakas,’ with translation (1861); ‘Two Jatakas’ (1870); ‘Dasaratha Jataka’ (1871); ‘Ten Jatakas’ (1872); ‘The Jatakas,’ with English commentary (6 vols., London 1877–96); ‘Indian Mythology according to the Mahabharata’ (1903). He published, under the pseudonym of V. Kristiansen, ‘Dictionnaire de la langue des rues’ (1866) and other works.

FAUST, foust, **Albert Bernhardt,** American Germanic scholar: b. Baltimore, Md., 20 April 1870. He was graduated at Johns Hopkins in 1889, took the degree of Ph.D. there in 1892 and matriculated at the University of Berlin in 1892. He studied and traveled abroad in 1892–94, was instructor in German at Johns Hopkins, 1894–96, associate professor of German at Wesleyan University, Conn., 1896–1903. In 1903–04 he was assistant professor of German at the University of Wisconsin and in 1904–10 at Cornell University, becoming full professor in the latter year. He is a member of the Modern Language Association of America and other learned societies and has published ‘Charles Sealsfield (Carl Postl), Der Dichter beider Hemisphären’ (1897); ‘The German Element in the United States’ (1909; Ger. trans. 1911), for which he was awarded the Conrad Seipp Memorial Prize by the University of Chicago and the Loubat prize by the Royal Prussian Academy of Sciences; ‘Guide to the Materials for American History in Swiss and Austrian Archives’ (1915). He edited ‘Zschokke's Tales’ (1895); ‘Heine's Prose’ (1909); and wrote ‘The Problematic Hero in German Fiction’ (1901); ‘Development of Goethe's Ethical and Religious Views’ (1902); ‘Defense and Interpretation of Book IX of Wolfram's Parzival’ (1903); ‘Friedrich Spielhagen’ (1905).

FAUST, or FUST, Johann, German goldsmith of the 15th century and one of the persons to whom the invention of printing was long mistakenly ascribed. It is now well established that he loaned money to Gutenberg, who had previously made some attempts with movable types at Strassburg, and took a mortgage on the business. In 1455 Faust prosecuted Gutenberg for money advanced, and seized enough of the apparatus to cover the mortgage. He improved and used the apparatus, and in the 16th century was hailed as the inventor of printing but modern research has established Gutenberg's claims on a firm basis. The third person concerned was Schöffer, who married the daughter of Faust, and who is allowed the honor of having invented punches and matrices for casting types, by means of which this grand art was carried to perfection. The first fruits of the new process, that is, a work printed with cast letters, appears to have been the ‘Mazarin Bible,’ or ‘Forty-two-line Bible’ (the latter name from the number of lines in a column) completed about 1455. Another early work was ‘Durandi Rationale Divinorum Officiorum,’ published by Faust and Schöffer 1459, followed a year or two after by the ‘Catholicon Johannis Januensis’; after which, in 1462, succeeded the ‘Latin and German Bible,’ so much sought for by those fond of early specimens of typography. There is reason to believe that Faust died of the plague in 1466, as the name of Schöffer alone is found in the books printed after that time at Maintz. Owing, perhaps, to a similarity of name some of the noted deeds of Dr. Faust have been ascribed in popular German legends to the printer.

FAUST, foust or **FAUSTUS,** fâs'tus, **Dr. John,** German magician: b. Knittlingen, Suabia; d. Staufen 1538. The facts of his life have almost entirely disappeared amid the legends and fables in which they have become wrapped up. He appears to have been a charlatan and adventurer who traveled from place to place, putting himself forward as a physician, alchemist and astrologer, and as a great magician and enchanter. At Würzburg he professed that he could perform all the miracles that Christ performed, and at Wittenberg claimed that the successes of the imperial troops in Italy had been brought about by his magical powers. Among the credulous and ignorant he naturally found many to put faith in his claims and at last his name became associated with a whole series of marvels. The first literary work of which he is the subject was published at Frankfort in 1587, by Johann Spies, and professes to narrate the ‘History of Dr. John Faust, the Far-famed Enchanter, and Professor of the Black Art.’ Enlarged editions soon appeared and the book was translated into English (about 1587), Low German, Flemish and French. In it we find most of the famous stories associated with Faust's name; how he sold himself to the devil for a period of 24 years; how, by the aid of the fiend Mephistopheles, he and his attendant and pupil, Wagner, were able for this time to enjoy all sorts of sensual delights and to travel about performing the most marvelous exploits, and how at last, when the end of the fatal compact arrived, after a night of dreadful tempest, his body was found almost torn limb from limb, lying on a dunghill at the village of Rimlich, near Wittenberg. It was on the English translation of Spies' book that Marlowe's great tragedy, 'The Tragical History of Doctor Faustus,' was based (1589). In 1599 the legendary history of Faust appeared at Hamburg in a new form, as narrated by G. R. Widmann, a zealous Lutheran, always eager to draw a lesson from the events with which he deals. In an altered edition of this by Pfitzer (1674) we first find the germ of Goethe's Margaret, the maiden whose fate is so tragically connected with that of Faust, in the great drama of the German poet. In the second part of his 'Faust,' Goethe has attempted a poetical solution of the legend. Through all vicissitudes he leads Faust to a point where at last he experiences the feeling of perfect happiness in devoting his intellectual faculties to the promotion of the welfare of his kind. Then he has attained the end which he has pointed out to Mephistopheles as the object of all his longings, and is removed from this life, not, however, to be lost, but to be saved by love, the «ever-womanly» that «leads us on high.» Goethe's famous poem attempts to show that man's longing after knowledge may lead him into many errors and failings, but cannot destroy his better nature. The story of Faust is essentially melodramatic and this, combined with its strong dramatic and spectacular features, has made it a popular story since the days of its first appearance in print. Marlowe, who followed the popular legend closely, recognized these dramatic elements and handled them with great skill. His drama, therefore, became one of the most successful plays in England and long held the boards. The legend of Faust took hold of the fancy of all Europe and traditions of the story were made from German into all the languages of the Continent. These formed the bases for countless stories founded upon the spectacular and miraculous elements in the Faust legend, which took strong hold of the religious fancy of the reformers from the days of Luther on. In these semi-religious, semi-pagan stories, Faust is ever represented as siding with or representing the forces of evil. So, therefore, when Goethe presents the salvation of Faust he goes contra to the whole spirit of the popular legend which always made the damnation of Faust the legitimate result of his compact with the devil. In his version, however, Goethe followed the brood of Faust stories of his day, many of which delighted in depicting the outwitting of the powers of evil and the ultimate salvation of him who had entered into relationship with them.

Goethe's 'Faust' was arranged for the stage by W. G. Willis in 1885. Among the various English translations of Goethe's 'Faust' that by Bayard Taylor is one of the most important. The opera of 'Faust' by Gounod was first produced in 1859. Lessing was attracted to the Faust story and essayed the subject in 1759 in his 'Faust and the Seven Spirits.' In 1778 Frederich Müller published parts of a drama of 'Faust' and Klinger published in 1791 a romance entitled 'Faust's Life, Death and Journey to Hell.' This was translated into English by Borrow in 1826. Goethe, who had long been attracted by the Faust story, published his first 'Faust Fragment' in 1790. The first completed part of 'Faust' appeared in 1808 and the second in 1832. It at once became popular in Germany and soon translations appeared in most of the languages of Europe. The most noted theatrical production of 'Faust' in English was that by Henry Irving of Will's adaptation. Two other well-known Faust tragedies in German were written, one by Klingemann (1815) and the other by Lenau (1836). This latter is full of the restless spirit of the age and is only overshadowed by Goethe's greater work. Rembrandt, Christoph von Sichem, Cornelius and Retzsch have illustrated the story of Faust. Naturally there is a vast amount of Faust literature of an explanatory historical and critical nature, the larger part of which has had its origin in Germany and the other Germanic countries. One of the best collections of the older Faust legends, stories and writings is that published by K. Engel in 1885.

FAUST. Grand opera in five acts by Charles François Gounod (libretto by Barbier and Carré, after Goethe's poem) first produced at Paris, 19 March 1859. Easily the most popular French opera of the second half of the 19th century, Gounod's masterpiece has penetrated to the farthest corners of the earth. The romantic story, the appealing figures of the lovers, with the sinister Mephistopheles in the background are admirable operatic material and Gounod's genius found its highest expression in the musical garment with which he clothed it. The opera abounds in sensuous melody that contains a potent magic. Its language was new to France, but the idiom was soon adopted by other composers to such an extent indeed that much of it has become hackneyed. It is not difficult to point to weaknesses, to dwell upon its cloying sweetness, to decry the soldiers' chorus as banal; but when all has been said, there remains a bulk of finely felt material used with skill and developed into stirring musical climaxes. There is a distinctive personal note throughout, traceable perhaps most directly in the striking combination of the voluptuous and the religious elements. It seems superfluous to single out the important numbers. The quartette in the garden scene is one of the most successful operatic ensembles, almost ranking with that in 'Rigoletto' in the success with which the diverse dramatic interests are harmonized. The succeeding love scene is borne along on an uninterrupted stream of delicious melody. The vigorous and dramatic kermesse scene and, above all, the thrilling final terzetto, which has done yeoman's service as a model for other composers, need but to be mentioned to be vividly recalled to mind.

Musical settings of Goethe's poem have been made by other composers. The most important are, Hector Berlioz's 'La Damnation de Faust,' a dramatic legend in four parts, first performed in Paris, 6 Dec. 1846, and generally given in concert form, to which it is better adapted, and Arrigo Boito's 'Mefistofele,' a grand opera in a prologue and five acts (later condensed to four) first produced at Milan, 5 March 1868. The latter, which still finds local and spasmodic favor in the opera house, was not without influence both on Verdi, with whom Boito, as librettist, was closely associated in his later years, and on Ponchielli and the later Italian composers.

An opera on the Faust legend by Ludwig Spohr was first produced at Frankfort, March

1818. The book has no connection with Goethe's poem and the work, which had a certain vogue in its own day, is of slight musical importance.

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FAUST. Goethe's 'Faust,' a poetic tragedy in two parts, is unquestionably the greatest, though not the only, treatment of its fruitful theme. Goethe began work on it as early as 1774. In November 1775, he carried with him to Weimar a manuscript, commonly called the 'Urfaust' ('Primitive Faust'), of which a fair copy was made by Fräulein von Göchhausen, a lady of the court. This copy, fortunately preserved, was discovered and published in 1887 by Erich Schmidt. Goethe's own first publication on this subject was 'Faust, ein Fragment' (1790), differing somewhat from the Göchhausen copy. Thereupon followed in 1808 the First Part of the tragedy. The Second Part was not taken resolutely in hand until 1827, and was not published until 1833, the year after Goethe's death.

It has been said that every age has its 'Faust' and that every poet writes his 'Faust.' If we disregard sundry mediæval analogues to the story, we may say that the original Faust was a semi-historical figure of the 16th century, perhaps one of the less worthy of the humanists — at any rate early reputed a magician, necromancer, something of a clown, and the victim of condign punishment for a dissolute life in league with the devil. So he appears in a chap-book of 1587, in popular dramas, and in puppet plays.

Some acquaintance with the traditional Faust Goethe acquired as a youth in Frankfort, Leipzig, and Strassburg, and the dramatic treatment of this problematic character was one of his first literary plans. What attracted him was of course not the vulgar marvels, or the lewd adventures, or even the supernatural powers attributed to the legendary Faust. Goethe saw in Faust, as in Götz von Berlichingen, one of the heroes of a spacious and expansive time, a man of like passions with himself, and a character which he could in infinite measure fructify with his own experiences and his own longings.

Goethe's Faust is a professor and scholar who aspires to penetrate to the essence of things. Unremitting application has made him master of all the knowledge that generations have accumulated. He knows his powers, but also his limitations. He has not found the key to unlock the mysteries of the universe and for this reason he has betaken himself to magic. By its aid he conjures up the spirit of that earth which he has been unable to comprehend. Nevertheless, he cannot bear direct contact with this spirit, which is too wonderful for him. The more readily, therefore, though disdainfully, he falls in with the proposal of another spirit, the mischief-maker Mephistopheles, that he seek enlightenment through experience in a field to which he has hitherto been a stranger, the field of life. Mephistopheles undertakes to introduce him first to the little, then to the great world. The reward for these services shall be the possession of Faust's soul, to be claimed when a moment arrives, so beautiful that Faust shall wish to prolong it.

This is the ground plan of Goethe's entire drama. The First Part comprises Faust's experiences in the little world, the Second Part, in general, those in the great world. The First part, moreover, best known and most admired, reaches its climax in Faust's seduction of Gretchen, one of the most pathetic tragedies ever written and one written with incomparable directness, simplicity and power.

The Second Part takes Faust to the imperial court, where he ingratiates himself with a frivolous emperor by arranging a pageant and by the invention of paper money. Here, however, Faust's eyes become opened to another great world which like a new planet swims into his ken. It is a part of the traditional story that Faust shall summon up the shades of great figures of the past for the amusement of his patrons and one of these is Helen of Troy — according to the chap-book, Mephistopheles procures him Helen for a concubine. But Goethe transforms the Spartan queen into the embodiment of the Greek ideal and when Faust has succeeded in his conjuration, he cannot refrain from seeking to make her his own.

The first instinctive effort fails. An explosion occurs which leaves Faust unconscious on the floor. In order to be united with Helen he must join her in her own sphere, and thither he must be furthered by a spiritual coadjutor as ideal as she is. His guide to the realm of antiquity is Homunculus, a spirit without a body, the product of German learning represented by Faust's former famulus, the pedantic but indefatigable Wagner.

In Sparta Faust ultimately finds himself the lord of a mediæval manor. Helen returns after the fall of Troy and for a brief but rapturous time she lives as the wife of Faust; until their son, Euphorion — a personification of the spirit of poetry whom Goethe was pleased to identify with Byron — perishes Icarus-like in consequence of his irresistible impulse to soar to the heights, and his mother departs with him.

The episode of Faust and Helen, published separately in 1827 as a «classic-romantic phantasmagoria, an interlude to 'Faust'», is, in the economy of the drama, a play within a play, and is surrounded with an operatic, even dream-like atmosphere. At its conclusion we find Faust once more in the German Empire. For aiding the emperor to put down a rebellion he is rewarded with the sovereignty over a tract of coastland. He reclaims an extensive domain from the sea, establishes a prosperous community, and confesses that in the prospect of benefit to untold future generations his supreme moment has come. He dies, but not to fall into the hands of Mephistopheles. Good spirits defend him; doctors and saints intercede for him; the spirit of Gretchen pleads for him; and as one who erred so long as he strove, but who strove, though blindly, so long as he lived, he goes to his reward.

The action above outlined constitutes a complete and consistent whole, and there is no reason for questioning Goethe's assertion that from the first he conceived the subject as a whole in essentially this form. Not only, however, did he give his work to the public in portions, but until the very last decade of his life he expected that it would remain a series of fragments. Even now it is fragmentary in execution, though not in conception. Some highly important links in the chain — such as, for example, a scene in Hades in which Faust secures from Persephone the release of the spirit of Helen — are left to be forged by the imagination. Indeed, 'Faust,' by contrast to the 'Divine Comedy' or to 'Paradise Lost,' goes forward by leaps and bounds, and conveys by implication as much as it sets forth explicitly — or more. Goethe's invariable habit was so to treat a situation or an incident as to give it a connotation of infinite relations. And as to 'Faust', he never wrote any passage or scene until he was ready to make what he wished to make of it for itself; and when he assembled passages and scenes written at widely different times, he gave them little or no editorial revision. From his point of view they needed none. Hence some inconsistencies, some undeniable difficulties, and even some irrelevancies.

But who would subject to rationalistic examination a plot that takes us from heaven through the world to hell, from Leipzig to Sparta, and from Troy to Missolonghi? Goethe's 'Faust' is a symbolical representation not merely of a type of character, not merely of the poet's own career, nor yet merely of the history of German culture in its richest period: 'Faust' is Goethe's encyclopedic comment on human life as such. The first words and the last bid us so regard it. It is a play: hence — after the dedication — a prologue in the theatre. It is a play, the chief character of which is a son and servant of God, no less representative of faithful humanity than Job: hence a prologue in heaven, in which the Lord gives Mephistopheles the privilege of tempting the hero. It is a play, the acts and facts of which are neither more nor less real than the acts and facts of our whole mundane existence amid the vain shadows of things. Of this the final *chorus mysticus* assures us:

> All things transitory
> But as symbols are sent.

'Faust' is a poem; or rather, a volume of poetry which for form ranges — not even disdaining prose — from the homely *Knittelverse* («doggerel rhymes») of Hans Sachs to stately hexameter; for method, varies from the minutest realism to the boldest figuration of visions unseen and undreamed of before; and for substance crystallizes the saturated fullness of a life of fourscore years.

In fine, 'Faust' is Goethe's philosophical testament. Even his idiosyncrasies find expression here: his preference for neptunism over vulcanism, his abhorrence of pedantry, his impatience with contemporary mediocrity and philistinism, his indifference to the empty framework of dilapidated institutions. But here he also gave utterance to his profoundest convictions concerning being, conduct, life, and destiny. Goethe can write cynically when he speaks for himself as well as from the lips of Mephistopheles. The «old heathen» could in his own person as little as in the person of his hero meet the test of Christian catechization; Faust does not reveal much capacity for repentance, and he reveals none for repining; he appears to be for the most part a ruthless self-seeker. Nevertheless, we may not unfairly call 'Faust' a Christian poem. Altruistic activity is the culmination of the course of Faust's development; altruistic intercession is not inoperative in his redemption; and the restlessly striving spirit in him works out its salvation because, consciously or unconsciously, it is ever drawn onward and upward by another spirit endowed with the divine attributes of goodness, love, and mercy. Translated by Bayard Taylor (Boston 1870–71) and by Anna Swanwick (London 1878). Edited by Calvin Thomas (Boston 1899). Consult Otto Pniower, 'Goethe's Faust; Zeugnisse und Excurse zu seiner Entstehungsgeschichte' (Berlin 1899); Veit Valentin, 'Goethes Faustdichtung in ihrer künstlerischen Einheit dargestellt' (in 'Æsthetische Schriften,' Vol. II, Berlin 1894); Jakob Minor, 'Goethe's Faust; Entstehungsgeschichte und Erklärung' (Stuttgart 1901); Friedrich Lienhard, 'Einführung in Goethe's Faust' (Leipzig 1913).

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FAUSTA, Flavia Maximiana, flā'vi-ạ mak"-sim-i-ā'nạ fâs-tạ, Roman empress: d. probably 326 A.D. She was a daughter of the Emperor Maximianus Herculius and was married to Constantine the Great 307; and, for reasons that have never been made clear, was executed by order of her husband.

FAUSTIN I, fō'stań' (FAUSTIN SOULOUQUE), dictator of Haiti: b. Petit Goave, Haiti, 1785; d. 6 Aug. 1867. He came of a poor negro family and in early life was servant to General Lamarre. In 1803 he took part in the negro insurrection and subsequently was made a captain by President Boyer. In 1844–47 Faustin was striving for power in the new Haitian Republic, after the defection of La Republica Dominicana, holding at that time the offices of governor of Port-au-Prince, and commander of the Presidential Guard. The Senate chose him President in 1847, thinking that he would be amenable to the will of that body, but he soon showed his independence and instigated a massacre of the mulattoes in Port-au-Prince on 16 April 1848. He had himself proclaimed emperor in 1849, and for 10 years ruled with iron severity and cruelty. In 1858 General Geffrard overthrew Faustin's government, forced him to abdicate and exiled him to Jamaica. He returned to Haiti a short time before his death.

FAUSTINA, Annia, an'i-ạ fas-ti'nạ (surnamed JUNIOR), Roman empress: d. near Mount Taurus, Asia Minor, 175 A.D. She was a daughter of Annia Galeria Faustina (q.v.) and was married to Marcus Aurelius 145 or 146 A.D., who, in spite of her profligacy, was devoted to her. After her death, charity schools were founded in her honor.

FAUSTINA, Annia Galeria (surnamed SENIOR), Roman empress: b. about 104 A.D.; d. 141. She was the wife of Antoninus Pius, and like her daughter, the wife of Marcus Aurelius, was noted for her licentiousness.

FAUSTUS OF RIEZ, rē'ĕz, Semi-Pelagian monk, who lived in the 5th century. He joined the monastic community of Lerins, where he was a fellow-student of Sechnall, better known as Saint Patrick, Apostle of Ireland. About 432 Faustus was chosen abbot of the monastery and in 457 became bishop of Riez (Regium), in Provence. In 481–85 his Trinitarian views having offended Eurich, king of the Western Goths, Faustus was an exile. He opposed all Eastern heresies but himself fell into error in regard to divine grace and the freedom of the will. He left letters, dogmatic and moral treatises and sermons. These include ‘Sermones al Monachos’; ‘De Dei Gratia.’ For text of Faustus' writings consult Migne, ‘Patrologia Latina’ (Vol. LVII) and Engelbrecht, ‘Corpus Scriptorum Ecclesiasticorum Latinorum’ (Vol. XXI, Vienna 1891). Consult Koch, ‘Der heilige Faustus’ (Stuttgart 1895) and Worter, ‘Zur Dogmageschichte des Semipelagianismus’ (Münster 1900).

FAUVEL, fō'vĕl', **Sulpice Antoine**, French physician: b. Paris, 1813; d. 1884. He was educated at the University of Paris, went to Turkey and was appointed member of the Sanitary Council of Constantinople in 1848. In 1866 he returned to Paris, and was soon afterward appointed chief of the Sanitary Department of the French government. His long residence in Turkey had made him thoroughly familiar with cholera and typhus. The quarantine regulations of most countries are based on his recommendations. He published ‘Le choléra, étiologie et prophylaxie’ (1868); ‘Rapports sur l'organization du service des quarantaines en Turquie’ (1873); ‘Règlement général de police sanitaire maritime’ (1876).

FAVARA, fā-vä'rä, Sicily, town, four miles southeast of Girgenti and nine miles from the Mediterranean, 1,066 feet above sea-level. It has mines of sulphur, tourmaline and alum, and nearby are marble-quarries. It markets fruit and has a castle of the Chiaramonte family, who in the 14th century were politically important. Pop. of the commune 21,599.

FAVARO, fa-vä'rō, **Antonio**, Italian mathematician: b. Padua, 1847. He received his education at Padua, and also at Turin and Zürich. He became professor of graphic statics at the University of Padua in 1872 and five years later he instituted a course in the history of mathematics at the same institution. He made a close study of Galileo's works and in 1887 was commissioned to prepare a national edition of the works of that savant. Favaro's works include ‘La statica grafica nell' insegnamento tecnico superiore’ (1873); ‘Lezioni di statica grafica’ 2d ed., 1877); ‘Miscellanea Galileiana inedita’ (1887); ‘Nuovi studi Galileiani’ (1891); ‘Trent' anni di studi Galileiani’ (1907); ‘Atti della nazione germanica artista nello Studio di Padova’ (1912).

FAVART, Charles Simon, sharl sē-môṅ fā-vär, **French dramatist**: b. Paris, 13 Nov. 1710; d. there, 18 May 1792. At 24 he was writing successful comedies. These and his operettas number about 150 (his wife, Marie Justine Bénédicte Duronceray, 1727–72, being his constant collaborator), and are for the most part pretty and realistic scenes of love in the country; but some of them are amusing drolleries like the mediæval fabliaux. They spent some time with the army of Marshal Saxe in Flanders, where their performances were so popular that the enemy desired to hear them. In 1745 Favart became director of the Opéra Comique, where his wife made the first attempt to harmonize her costume with the character she was representing. His most celebrated compositions are ‘Annette and Lubin’; ‘The Village Astrologer’; ‘Ninette at Court’; ‘The Three Sultanas’; ‘The Englishman at Bordeaux.’ His ‘Memoirs and Correspondence’ (3 vols., 1808) is of great value for the history of literature and the drama.

FAVERSHAM, făv'ėr-shăm, **William**, American actor: b. England, 17 Feb. 1868. He was educated at Hillmartin College, London, and served in the English Yeomanry. In 1888 he came to the United States, and 1893 joined the Empire Theatre Company, of which he became leading man in 1896. He left the Empire Company in 1901 and starred as Don Cæsar in ‘A Royal Rival.’ In 1908 he appeared in New York under his own management in ‘The World and His Wife.’ The following year he produced Stephen Phillips' ‘Herod,’ appearing in the title rôle. Other successful rôles were Jim Carson in ‘The Squaw Man’ (1906); Antony in ‘Julius Cæsar’ (1912) and Iago in ‘Othello’ (1914).

FAVERSHAM (ancient FAVERSFIELD), England, municipal borough and seaport in the county of Kent, 52 miles by rail southeast of London. It is a corporate member of the Cinque Port of Dover, and it contains three suburbs and has a handsome cruciform church. The chief manufactures are gunpowder, Roman and Portland cement, bricks and beer; it has large oyster fisheries. Its exports are chiefly hops and agricultural produce and imports timber and coal. It was once the seat of the Saxon kings, and, in 930, Athelstane held here a Witenagemot, or great national council. There are still in existence remains of the abbey built by King Stephen, in 1147, for the Benedictine monks. The tomb of the king, who was buried in the abbey, is now pointed out in the parish church. In 1688 James II, when trying to escape to France, after the landing of William of Orange, was seized at Faversham and sent back to London. Later he succeeded in reaching France. Pop. 10,619.

FAVIGNANA, fā-vēn-yä'nä (ancient ÆGUSA or ÆTHUSA): (1) an island of the Ægades group in the Mediterranean, eight miles from the west coast of Sicily; area, 11 square miles. There is a fine bay on the east on which stand the town and fortress of San Leonardo. San Giacomo, the principal place, is on the north coast. The island has several quarries and extensive tunny and anchovy fisheries, in the produce of which, and in sheep, goats and poultry, it has a flourishing export trade. Pop. 6,079. (2) A town of the same name, with a fine harbor, is on the north side of the island.

FAVORINUS, Greek sophist and philosopher, of the 2d century, A.D. He was a native of Arles, Gaul, but early in life began his travels in Italy, Greece and the East. His great learning together with his oratorical powers brought him into prominence both at Athens and at Rome. He was a close friend of the Emperor Hadrian, with Plutarch, Demetrius, Aulus Gellius and other prominent persons of his day. His great rival was Polemon of Smyrna. Favorinus wrote very many works, but only a few fragments have been preserved to us. His ‘Pantodape Historia’ (Miscellaneous History) appeared in 24 books and was used by Diogenes Lærtius. He wrote also ‘Apomnemoneumata’ (Memoirs); ‘Peri Paidōn Trophes,’ a work on child-training; and ‘Pyrroneioi Tropoi’ (Pyrrhonean Tropes). Consult Christ-Schmid, ‘Geschichte der griechischen Litteratur' (Vol. II, 5th ed., Munich 1913); Gabrielsson, 'Ueber Favorinus und seine Παντοδαπὴ 'Ιστορία' (Leipzig 1906); Schick, 'Favorin Περὶ Παίδων Τροφῆς und die antike Erziehungslehre' (ib. 1912).

FAVORITA, La, grand opera in four acts by Gaetano Donizetti (libretto by Royer and Waetz) first produced at Paris 2 Dec. 1840, the same year as the production of his 'La Fille du Regiment.' In contrast with the latter, it was an immediate success, though time has since reversed the verdict. The subject matter of the book is borrowed from a French drama 'Le Comte de Commingues' and has a strong dramatic climax. The title refers to Leonora, the favorite of King Alphonso of Castile, whom the Pope will not permit him to marry. She and Fernando, a young novice of the monastery, have fallen in love. The king resolves to aid them, but Fernando learning of her past, seeks refuge in the monastery. Leonora follows him and after convincing him of the purity of her love, expires in his arms. Donizetti never wrote anything more dramatic than the last act of this opera. It is credibly claimed that he composed practically the whole of it (with the exception of the romanza «Spirito gentil,» which was taken from an unpublished work) in from three to four hours — a remarkable instance of his facility in writing. In the first act, the aria «Una Virgine» sung by Fernando, and the duet between him and Leonora may be singled out for mention. The aria «O mio Fernando» in the third act is a favorite with all contraltos and the concerted finale of this act is one of the most effective in all Donizetti's works. The chorus of monks in the first scene of the fourth act, the exquisite «Spirito gentil,» already referred to — the most popular piece in the opera — and the closing duet, full of pathos and beauty, are the most conspicuous numbers.

LEWIS M. ISAACS.

FAVOSITIDÆ, fav-ō-sit'i-dē, a palæozoic family of fossil tabulate corals, having the septa and corallites distinct and little or no true cœnenchyma. The corallites are uniformly prismatic, tall and united by their thick walls, which are perforated by large pores, representing aborted buds. The typical forms (*Favosites*) make large compact masses, taking an important part in the formation of Silurian and Devonian limestones. About 10 genera are indicated by the numerous and widely distributed species.

FAVRAS, fa'vrą', **Thomas de Mahy,** MARQUIS DE, French Royalist: b. Blois, 26 March 1744; executed, Paris, 19 Feb. 1790. He came of a poor family of the nobility, entered the army, was a captain of dragoons at 17, and saw some action in the Seven Years' War. He became first lieutenant of the Swiss guards of the Count of Provence (later Louis XVIII) in 1772, and being unable to maintain his rank he retired three years later. In 1787 he raised a legion to help the Dutch against William IV and the Prussians. At the outbreak of the Revolution he returned to France and becoming implicated in schemes for the escape of the king, he was betrayed by officers to whom he revealed his plans. He was arrested, kept in prison about two months, then tried, convicted and executed. Consult memoir by Freiherr von Stillfried Ratènic (Vienna 1881) and article by Alexis de Valon in *Revue des deux mondes* (15 June 1851).

FAVRE, fävr, **Gabriel Claude Jules,** French politician: b. Lyons, 21 March 1809; d. Versailles, 20 Jan. 1880. He took an active part in the Revolution of July 1830, studied law, and after distinguishing himself at the Lyons bar came to Paris in 1835, where he became famous as a defender of political prisoners. On the outbreak of the Revolution of 1848 Ledru-Rollin made him secretary to the Ministry of the Interior. He was a leader of the party of opposition to the President Louis Napoleon; and after the *coup d'état* (1851) retired from political life for six years, till in 1858 his defense of Orsini for the attempt on the life of the emperor again brought him forward and secured his election for Paris. From this time he again became an active leader of the Republican opposition to the emperor. In 1868 he founded the Republican journal *L'Electeur,* and opposed with all his powers the declaration of war against Prussia. On the fall of the empire he became vice-president of the government of national defense and Minister of Foreign Affairs, and as such conducted the negotiations for peace with Prince Bismarck. But his operations both in the matter of the armistice and the peace showed a lack of skill and judgment. His agreement to exclude Bourbake's army from the armistice was never forgiven him. He was elected to the French Academy in 1867. He was author of 'Rome et la République Française' (1871); 'Gouvernement de la Défense Nationale' (1871–75); 'Conférences et Discours Littéraires' (1873); 'Discours Parlementaires' (1881); 'Mélanges Politiques' (1882).

FAVRE, Jean Alphonse, Swiss geologist: b. Geneva, 31 March 1815; d. there, June 1890. He studied at the Geneva academy, and for many years held the chair of geology there. He subsequently became president of the Federal Commission in charge of the geological map of Switzerland. He made special studies in the ancient glacial phenomena of the Alpine regions. He also did notable work on the folding of rocks. He published 'Recherches géologiques dans les parties de la Savoie, du Piémont et de la Suisse voisines du Mont Blanc' (1867).

FAVRE, Louis, French engineer: b. Chêne-Bourg, near Geneva, 29 Jan. 1826; d. 21 July 1879. He was born of humble parentage and received a very indifferent education; but by dint of remarkable genius, untiring energy and fertility of resources became one of the greatest of engineers. He went to Paris and rapidly gained a high reputation as a contractor for public works. In 1872 he gained the contract for the construction of the Saint Gothard tunnel, a work which was to be completed within eight years, and which engineering feat he had almost accomplished when he died.

FAVUS. See RINGWORM.

FAWCETT, Edgar, American poet and novelist: b. New York, 26 May 1847; d. 1904. He was educated at Columbia University, where he was graduated in 1867. From youth onwards he was a frequent contributor to periodicals and wrote many works of poetry, fiction, etc. His works include 'Short Poems for Short People' (1871); 'Purple and Fine Linen'

(1873); 'Poems of Phantasy and Passion' (1878); 'The False Friend,' a play (1880); 'The New King Arthur' (1883); 'Song and Story' (1884); 'Romance and Reverie' (1886); 'Fair Fame' (1894); 'Outrageous Fortune' (1895); 'The Ghost of Guy Thyrle' (1897).

FAWCETT, Henry, English economist: b. Salisbury, 25 Aug. 1833; d. Cambridge, 6 Nov. 1884. He was educated at King's College School and at Cambridge University. In 1858 he was suddenly deprived of his eyesight by an accidental shot from a gun in his father's hand. This misfortune did not deter him from a public career, he walked, rode, skated and fished and studied music. In 1863 he published a 'Manual of Political Economy,' which went through several editions. In 1863 he was made professor of political economy at Cambridge. He was elected to Parliament in 1865 as an advanced Liberal and advocated many reform measures. He devoted much time to the study of Indian finance, which he regarded as the key to successful government in India. Fawcett fought for a thorough housecleaning in Indian finances and overcame strong official opposition. He was defeated at the election of 1874, but was soon after returned for Hackney. He became postmaster-general in Gladstone's Cabinet in 1880, where his administration was most successful. He wrote 'Economic Position of the British Labourer'; 'Pauperism'; 'Essays and Lectures on Social Subjects' (1872); 'Speeches on Some Current Political Questions' (1873); 'Free Trade and Protection' (1878); 'Indian Finance' (1880). He was one of that school of economists inclined in the direction of emphasizing individual liberty and limiting the interference of the state, although he was willing enough that the state should endeavor to elicit thrift and self-help through the medium of the post office, or protect the interests of those who could not defend themselves, such as children who needed education, or agricultural laborers who were deprived of commons. Consult biography by Sir Leslie Stephen (London 1885).

FAWCETT, Millicent Garrett, English political economist: b. Aldeburgh, Suffolk, 11 June 1847. She was married to Henry Fawcett (q.v.) 1867. She has taken a very prominent part in movements relating to women, for obtaining the parliamentary franchise for them, and is associated with the constitutional as opposed to the militant suffragists. Her published works include 'Political Economy for Beginners' (1870); 'Tales in Political Economy' (1875); 'Janet Doncaster,' a novel (1875); 'Life of Sir William Molesworth' (1901); 'Five Famous French Women' (1906).

FAWKES, fâks, Guy, English conspirator: b. York, England, 1570; d. Westminster, 31 Jan. 1606. He was of Protestant parentage and brought up in that faith, but under the influence of his stepfather, Dionis Baynbrigge, became a Roman Catholic. He enlisted in the Spanish army in the Netherlands in 1593, and was present at the capture of Calais in 1595. Of a fearless and intrepid temper, he became involved in conspiracies with Catesley and others. He returned to England with Winter, one of the conspirators, in 1604, after agreeing to assist in the Gunpowder Plot (q.v.). He passed under the name of Johnson, as servant to Thomas Percy, another conspirator, and was placed to lodge in the house next to the Parliament House. After collecting the necessary combustibles, Fawkes worked his way into the coal cellar under the House of Lords, and after storing it with gunpowder, etc., was appointed to the dangerous duty of firing the mine. The government having had timely information of the detestable plot, the House of Lords and its cellar were searched, and Fawkes found secreted amid some casks of gunpowder, 4 Nov. 1605. At midnight (5 November) the authorities returned and arrested Fawkes. He suffered death at Westminster with three of his fellow conspirators. The anniversary of the discovery of the plot, 'Guy Fawkes Day,' was long commemorated, when his effigy was burnt. Consult 'The Gunpowder Plot' (1679); Gardiner, 'What the Gunpowder Plot Was' (1897); and Howell's 'State Trials' (1809–28).

FÁY, fī or fäy, **Andreas,** Hungarian author: b. Kohány, Zemplin, Hungary, 30 May 1786; d. Budapest, 26 July 1864. Till the appearance of Kossuth on the scene (1840) he was the foremost leader at Budapest of the Opposition party; thereafter he took no considerable part in politics, but promoted many important national enterprises. His volume of poems, 'New Garland' (1818), established his fame as a poet, but his admirable prose 'Fables' (1820) attained a far wider popularity. Among his dramatic works are the tragedy, 'The Two Báthorys' (1827); and several comedies, the most notable being 'The Old Coins; or the Transylvanians in Hungary' (1824), and 'The Hunt in the Matra' (1860). His social novel, 'The House of the Béltekys' (1832); 'Dr. Javor and his Servant Ambrose' (1855), and a number of short stories, entitles him to a place among the great masters of Hungarian prose.

FAY, fā, **Charles Alexandre,** French military officer: b. Saint-Jean-Pied-de-Port, 1827. He received his education at the military school of Saint-Cyr and at the General Staff school. He first saw active service in Africa and in the Crimean War served as aide-de-camp to General Bosquet, winning distinction at the battles of Alma and Inkerman. In 1870 he was a member of Bazaine's staff and was made prisoner at Metz. He was appointed brigadier-general in 1874 and charged with reorganizing the bureau of the general staff. In 1890 he was given command of an army corps and retired in 1892. His published works include 'Souvenirs de la guerre de Crimée' (1867); 'Etude sur la guerre d'Allemagne en 1866' (1867); 'De la loi militaire' (1870); 'Journal d'un officier de l'armée du Rhin' (1871; 5th ed., 1890); 'Etudes de marches: Jéna, Sedan' (1899).

FAY, Charles Ernest, American educator and alpinist: b. Roxbury, Mass., 10 March 1846. He was graduated from Tufts College in 1868 and has been professor of modern languages there since 1871. A founder of the Modern Language Association of America and of the New England Modern Language Association, also of the New England Association of Colleges and Preparatory Schools (1885) of which he was president 1888–89. In American mountaineering he has held a prominent place, taking part in the founding of the Appalachian Mountain Club (1876) and the American Alpine Club (1902), both of which he has served as president. He has also edited their publications *Appalachia* and *Alpina Americana,* furnishing numerous articles for the former and richly illustrated monograph ‘The Rocky Mountains of Canada’ for the latter. He counts among the pioneers in the exploration of the Alpine regions of the Dominion. His activity in these fields has been recognized abroad by his election as an honorary member of the English, Italian and Canadian Alpine Clubs. He is a frequent lecturer on literary and geographical subjects.

FAY, Edwin Whitefield, American educator: b. Minden, La., 1 Jan. 1865. He was graduated at the Southwestern Presbyterian University in 1883, received the degree of D.Ph. at Johns Hopkins in 1890, and studied at Leipzig in 1891–92. In 1890–91 he was instructor in Sanskrit and classics at the University of Michigan, in 1892–93 he was acting associate professor of Latin at the University of Texas, in 1893–99 professor of Latin at Washington and Lee, and since 1899 professor of Latin at the University of Texas.

FAY, fī, **Joseph,** German painter: b. Cologne, 10 Aug. 1815; d. Düsseldorf, 27 July 1875. His art education began in the Düsseldorf Academy and was continued in Paris where he turned his attention to historical painting. His first picture ‘Samson and Delilah,’ was exhibited in his 27th year. He painted a series of frescoes in the Council Chamber at Elberfeld, in which was portrayed the history of Germany from the destruction of the Varian legions. His fertile pencil produced among other pictures ‘Thisbe’; ‘Romeo and Juliet’; ‘Gretchen.’ He later on paid some attention to genre, depicting scenes in Italian life, reminiscences of travel in the peninsula. Felicitous conception, brilliant coloring and dextrous brush work are conspicuous in his productions.

FAY, Theodore Sedgwick, American writer: b. New York, 10 Feb. 1807; d. Berlin, Germany, 17 Nov. 1898. He was eminent in periodical journalism for years. To this period belongs his book ‘Dreams and Reveries of a Quiet Man’ (1832). He served with ability in the United States diplomatic service, first as secretary of the legation at Berlin (1837–53), and then (1853–61) as Minister at Berne, Switzerland; and wrote ‘Norman Leslie’ (1835); and ‘The Countess Ida’ (1841), tales; ‘Ulric’ (1851), a poem; ‘Views of Christianity’ (1856); ‘The Three Germanys’ (1889); ‘Great Outlines of Geography’; ‘History of Switzerland,’ etc. After 1861 he lived in Berlin.

FAYAL, fī-äl' (Port. fī-äl), one of the Azores group, in long. 28° 41′ W.; lat. 38° 31′ N. It is 14 miles long by 10 broad; area, 69 square miles. It rises abruptly from the sea and the centre is about 3,000 feet in height. The climate is temperate all the year. Volcanic eruptions have taken place, but not in recent years. The soil is fertile and the principal productions are wheat, maize, flax, fruits. Hunting small game, fishing, whaling, raising cattle and agriculture are the leading occupations. Horta or Orto (pop. 6,734) is chief port, and has one of the best sites for a harbor in the Atlantic. Fayal is an important telegraph cable and wireless centre. Pop. 22,385.

FAYE, fä, **Hervé Auguste Etienne Albans,** French astronomer: b. Saint Benoit du Sault, France, 5 Oct. 1814; d. Passy, near Paris, 4 July 1902. He studied at the Ecole Polytechnique, where he was professor of geodesy in 1848–54, and later of astronomy, and in 1878 was appointed director at the Paris Observatory. He discovered the periodical comet which bears his name in 1843; became rector of the university academy of Nancy in 1855; inspector-general of higher education in 1857–62, was made chevalier of the Legion of Honor in 1843 and promoted to grand officer of the Legion in 1889. He wrote several books on astronomical subjects, among which are ‘Sur l'Origine du Monde’ (1884); ‘Cours d'Astronomie de l'Ecole Polytechnique’ (1881–83); ‘Nouvelle étude sur les Tempêtes, Cyclones, Trombes, ou Tornados’ (1897). In collaboration with C. Galusky, he translated Humboldt's ‘Cosmos’ (4 vols., 1843–59).

FAYENCE. See Faïence.

FAYERWEATHER, fär'-weth'ẽr, **Daniel B.,** American merchant and philanthropist: b. Stepney, Conn., 1821; d. 1890. He was long prominent in the leather business in New York and bequeathed some $5,000,000 to educational and charitable institutions. His will was subjected to a prolonged contest from which the beneficiaries emerged victorious.

FAYE'S COMET, a periodic comet, discovered by Faye on 22 Nov. 1843. It reappeared in 1851, 1858, 1865, 1873, 1880, 1888, 1895, 1910 and 1917.

FAYETTE, fä-et', Iowa, town in Fayette County, on the Chicago, Milwaukee and Saint Paul Railroad, 65 miles northwest of Dubuque. It is the seat of Upper Iowa University, a Methodist Episcopal institution founded in 1857, one year after the settlement of the town. The town contains a Carnegie library and has a creamery and agricultural interests. It was incorporated as a town in 1874 under a general State law. The waterworks and electric-light plant are municipally owned. It is located in an excellent agricultural section. Pop. 1,112.

FAYETTE, Mo., city, county-seat of Howard County, 105 miles east by south of Kansas City, on the Missouri, Kansas and Texas Railroad. It is the seat of the Howard Payne College for women, founded in 1844, and the Central College, coeducational, founded in 1857, both under the auspices of the Methodist Episcopal, South, Church. It is in an agricultural section and the trade and industries are connected with agricultural products. It contains a Carnegie library and owns its waterworks and lighting plant. Pop. 2,586.

FAYETTEVILLE, fä-et'vĭl, Ark., city and county-seat of Washington County, on the Saint Louis and San Francisco and the Kansas City and Memphis railroads; in the Ozark Mountains. It is a well-known summer resort and is called the «Athens of Arkansas.» Fayetteville is a fruit centre for northwestern Arkansas. It is the seat of the Arkansas Industrial University. A national cemetery, containing 1,236 graves, 782 of unknown dead, and a Confederate cemetery, in the centre of which stands a handsome monument, are situated here. The city contains also a hospital, county jail and a courthouse. Fayetteville has manufactures of lumber, flour, wagons, foundry products, etc., and a trade in live stock, grain, fruit and agricultural produce. The waterworks are owned by the municipality. Pop. 4,471.

FAYETTEVILLE, N. C., city, county-seat of Cumberland County, on Cape Fear River, and on the Atlantic Coast Line and the Norfolk Southern railroads, 120 miles south of Wilmington. It contains a high school, military academy, a State colored normal school, an Elks home, a bank and several newspapers. The city is in a fertile agricultural region, carries on a trade in cotton and naval stores, and has extensive manufactures of cotton, silk, cottonseed oil, lumber, furniture, flour, woodenware, tools, etc. There is also a large vineyard. Manufacturing has been greatly enhanced by the development of electrical power from the Buckhorn Rapids above the city, and the canalization of the Cape Fear River from Fayetteville to Wilmington, ensuring a depth of eight feet. The city government, under a charter of 1893, is vested in a mayor, chosen annually, and a municipal council, elected on a general ticket. It owns the waterworks and electric-light plant. Settled by the Scotch in 1736 and laid out as Campbellton in 1762, Fayetteville received its present name during a visit of Lafayette in 1784 and was incorporated as a city in 1893. In 1831 it was almost completely destroyed by fire. On 22 April 1861, the Confederates seized the United States arsenal at this point. General Sherman occupied the town 11–14 March 1865, and destroyed the arsenal. Pop. 7,045.

FAYETTEVILLE, Tenn., town, county-seat of Lincoln County, on the Elk River, the Nashville, Chattanooga and Saint Louis Railroad, 180 miles east of Memphis. The Fayetteville Collegiate Institute, the Morgan Training School and Dick White College are located here. It is the centre of a fertile agricultural district, producing corn, cotton, wheat, tobacco, fruits and live stock. There are lumber, cotton and flour mills, and an ice factory. The waterworks are owned by the municipality. Andrew Jackson encamped here on 7 Oct. 1813, when he was campaigning against the Creek Indians. He visited the town again in 1826 and was lavishly entertained. Pop. 3,439.

FAYRER, Sir **Joseph,** English physician: b. Plymouth, 6 Dec. 1824; d. Falmouth, 21 May 1907. He received his education at the Charing Cross Hospital, London, and at Edinburgh and on the Continent. In 1847 he was appointed medical officer of H. M. S. *Victory* and later accompanied Lord Mount-Edgcumbe on a tour of Europe, during which he served in military hospitals at Palermo and Rome. In 1850 he became assistant surgeon in Bengal, saw service in the Burmese campaign of 1852 and was Residency surgeon at Lucknow during the Indian mutiny. In 1859–72 he was professor of surgery at the Medical College of Calcutta and in 1874–95 was president of the medical board of the India office, London. He was created a baronet in 1896 and in 1901 was appointed physician extraordinary to Edward VII. He published 'Clinical Surgery in India' (1866); 'The Thanatophidia of India' (1872); 'Lettsomian Lectures on Fever and Dysentery in India' (1881); 'On the Preservation of Health in India' (1898); 'Recollections of My Life' (1900).

FAYUM, or **FAYOUM,** fī-oom′, The (Egypt. *Phiom,* «marsh-land»), province of Egypt, consisting of a nearly circular basin or oasis, 670 square miles in area, sunk beneath the level of the Libyan Desert, about half a degree south of Cairo, and connected with the Nile Valley by a narrow pass, through which an ancient canal flows. This canal is the Bahr-Yûsuf, or «Joseph's stream,» so named after Saladin, who restored an original construction of the Theban Pharaohs, which pours the fertilizing water which renders the Fayyûm one of the most productive parts of Egypt. The irrigation was anciently regulated by a large reservoir, called Lake Mœris, described by the Greeks as a work of extraordinary hydraulic ingenuity, and the overflow now forms the large sheet of brackish water, 35 miles long, known as the Birket-el-Karn, which marks the eastern boundary of the oasis. The site was identified by Linant near the modern capital Medinet-el-Fayyûm, though other sites have been suggested by Cope, Whitehouse and others. On the banks of Lake Mœris was the famous Labyrinth, probably built by Amenhemhat III, and reckoned one of the wonders of the world. The remains of this vast palace are seen in the ruins of numerous chambers near the brick pyramid of Hawâra. The capital of the Fayyûm was Crocodilopolis, afterward named Arsinoë, after the queen of Ptolemy Philadelphus, near the site of which is the modern chief town Medinet-el-Fayyûm. Fidimin is a picturesque village in the Fayyûm. Recent explorations by Petrie and others have revealed more interesting remains of antiquity in the province than had formerly been suspected. The Fayyûm abounds in fruit, oranges, peaches, pomegranates, olives, figs, grapes, etc., and is famous for roses and other flowers. The inhabitants are chiefly agriculturists and fishermen. The construction of the Assuân Dam has immensely increased the productivity of part of this region, three crops being raised in 20 months. The chief products are cotton and cereals, other crops being rice, sugar, flax and hemp. Pop. 441,583. Consult for an account of excavations in the Labyrinth the ruins at Hawâra, etc., Flinders Petrie, 'Hawâra and Arsinoë'; Brown, 'The Fayyûm and Lake Mœris' (1893); Willcocks, 'The Assuân Reservoir and Lake Mœris' (1904); Beadnell, The Topography and Geology of the Fayum Province of Egypt' (1905).

FAZY, fa-zē **(Jean) James,** Swiss statesman: b. Geneva 1794; d. 1878. He received his education at the University of Paris and devoted himself to a close study of political economy. In 1820 he opposed the restoration of the Bourbons, returned to Geneva in 1826 and founded *Le Journal de Genève.* Within a few years he was again in Paris engaged in journalism. He protested against the ordinance limiting the freedom of the press, took part in the July revolution and advocated the setting up of a republic. His radical views coupled with his opposition to the Duc d'Orléans resulted in his imprisonment. In 1833 he returned to Geneva, founded the *Revue de Genève* in which he violently opposed the Conservatives and materially aided in their overthrow in 1846. For the ensuing 18 years he was the most prominent political figure in the Canton de Genève and in 1848 was one of the framers of the Federal constitution. In the late sixties he became professor of international law at the University of Geneva. He published 'L'homme aux

portions: Conversations politiques et philosophiques' (1821); 'Principes d'organisation industrielle' (1830); 'Histoire de Genève' (1840); 'De l'intelligence collective des sociétés' (1874). Consult Fazy, H., 'James Fazy, sa vie et son œuvre' (Geneva 1887).

FEA, fē, **Allan,** English historical writer: b. 25 May 1860. He was employed in the Bank of England 1880–1900, and is the author of 'The Flight of the King'; 'Secret Chambers and Hiding Places'; 'King Monmouth'; 'Nooks and Corners of Old England'; 'James II and His Wives'; 'Quiet Roads and Sleepy Villages,' etc.

FEA, fä'ä, **Carlo,** Italian archæologist: b. Pigna, Piedmont, 2 Feb. 1753; d. Rome, 18 March 1836. He received the degree of doctor of laws from the University of La Sapienza, but afterward became absorbed in archæological studies and in order to obtain better facilities for their prosecution he took sacred orders in 1798. In the following year he was imprisoned by the Neapolitans as a Jacobin, but was soon afterward liberated and made Commissario delle Antichitá and librarian to Prince Chigi. He revised, with notes, an Italian translation of Winckelmann's 'Geschichte der Kunst' and wrote 'Miscellanea filologico-critica ed antiquaria' (1790–1837); 'L'integrità del Panteone rivendicata a M. Agrippa' (1807–20); 'Relazione d'un viaggio ad Ostia ed alla villa di Plinio' (1802); 'Della statua di Pompeio Magno del palazzo Spada' (1812); 'Iscrizioni di monumenti publici' (1813); 'Descrizione di Roma' (1822) and 'Frammenti di Fasti Consolari.'

FEALTY, loyalty; faithful adherence; true service or duty to a superior lord, the obligation which bound the tenant, especially in feudal times. Fealty, suit of court and rent, were conditions upon which the ancient lords granted their lands to feudatories; it being stipulated that they and their heirs should take the oath of fealty or fidelity to their lord, which was the feudal bond (*Commune vinculum*) between lord and tenant; that they should do suit, or duly attend and follow the lord's courts, and there from time to time give their assistance, by serving on juries either to decide the property of their neighbors in the court baron, or correct their misdemeanors in the court leet; and lastly, that they should yield to the lord certain annual stated returns, in military attendance, in provisions, in arms, in matters of ornament or pleasure, in rustic employments (prædial labors), or (which is *instar omnium*) in money, which provided all the rest; all of these services being comprised under the one general name of redditus, return or rent. The right of fealty still exists in England, but is exacted only from copyholders. It lasted in the United States for a short time after the Revolution, but soon became obsolete.

FEAR, apprehension of approaching evil, danger or harm; solicitude, dread, terror. The term fear is also used in the sense of respect for and obedience to authority, especially as these take the form of awe and reverence toward the Supreme Being, with due regard to his law and word. The operation of fear on the mind is often, if uncorrected, attended with the most serious consequences, especially where sickness is present or disease threatened. On many persons the influence of fear is far more serious in its effect than the worst form of any dreaded malady. In epidemic diseases the terror they inspire is often as fatal as the infection — paralyzing the system, and robbing the body of the natural elasticity of its nervous stamina, and the mind of the buoyancy of hope, making victims of those who, from age and strength, had the best probability of escaping. Fear is a mental poison, and the most potent of all antagonists to health and medicine; it is often fatally active in the morbid developments which result in various forms of insanity; and as faith has cured more diseases than physicians ever prescribed for, so fear is more destructive than the worst physical malady. In the conflicts of the modern business world, especially in monetary centres, its contagion now and then breaks out in fright which imperils the fortunes of individuals, or a people's financial stability, as a country's cause is sometimes lost through panic striking its armies in battle. Recent psychology finds in fear one of its most important subjects for analysis and definition; and the physician, the teacher, the moralist and the sociologist all deal with it as an element calling for special study and control in the development of the individual and of society at large. Consult Darwin, 'The Expression of Emotions' (1892); James, 'Principles of Psychology' (1891); McDougall, 'Social Psychology' (1911); and 'Encyclopedia of Religion and Ethics' (1912). See EMOTION.

FEARN, Richard Lee, American journalist: b. Mobile, Ala., 31 Aug. 1862. He was educated at the University of the South, the University of Alabama and the Stevens Institute of Technology. From 1886 to 1891 he was a member of the staff of the Brooklyn *Eagle* and in 1891–93 was secretary of foreign affairs of the Columbian Exposition, Chicago. From 1893 to 1897 he was Washington correspondent and in 1896 London correspondent of the United Press. Since 1896 he has been on the staff and in 1902–09 was chief of the Washington bureau of the New York *Tribune*.

FEARNE, Charles, English jurist: b. London 1742; d. Chelmsford, 25 Feb. 1794. He was educated at Westminster School and entered the legal profession. His legal talents were of the highest, but he neglected his profession and devoted himself to scientific experiments. In this manner he expended his fortune and at his death his widow and family were left in straitened circumstances. A decision of Lord Mansfield in 1772 called forth from Fearne his 'Essay on the Learning of Contingent Remainders and Executory Devises,' which at once established his reputation as a legal authority and caused a reversal of the decision. A volume, 'Fearne's Posthumous Works,' appeared in 1797 for the benefit of his widow.

FEARNLEY, fĕrn'lĭ, **Carl Frederik,** Norwegian astronomer: b. Frederikshald, 19 Dec. 1818; d. Christiania, 22 Aug. 1890. He studied at Bonn and Königsberg, returning to Christiania and becoming professor of astronomy at the university 1857, director of the observatory 1861, and head of the geodetic survey of Norway 1876. He published 'Zur Theorie der terrestrischen Refraktion' (1884); 'Zonenbeobachtungen der sterne zwischen 64° 50' und

70° 10′ nördlicher Deklination' (1888); 'Katalog von 3949 Sternen' (1890).

FEARNLEY, Thomas, Norwegian landscape painter: b. Frederikshald, 27 Dec. 1802; d. Munich, 16 Jan. 1842. He studied at Copenhagen, and subsequently traveled much, painting excellent landscapes, most of which are in England. Among his works are 'Copenhagen'; 'View of the Marumelf'; 'Justedal Glacier'; 'Duck Shooting'; 'Ronsdalhorn'; 'Grindelwald Glacier'; 'Sorrento'; 'Madumsfall'; 'Castelmare'; 'Moonlight'; 'Gravius Fjord'; 'View in Norway'; 'Labrofos Waterfall.'

FEAST, a festival, banquet, solemnity, holiday, etc. Almost every religion has had its solemn feast-days. The ancient Greeks and Romans had them, as well as the Jews and modern Christians. According to the Old Testament, several festivals among the ancient Jews were divinely appointed, the first and most ancient of which was the Sabbath, or seventh day of the week, commemorative of the creation. The Passover was instituted in memory of their deliverance out of Egypt, and of the favor of God in sparing their first-born when those of the Egyptians were slain. The feast of Pentecost was celebrated on the 50th day after the Passover, in memory of the law being given to Moses on Mount Sinai. The feast of Tents or Tabernacles was instituted in memory of their fathers who dwelt in tents for 40 years in the wilderness; and all Israel was obliged to attend the temple and dwell eight days under tents. These were the principal feasts, but they had numerous others — the feast of Trumpets, the feast of Expiation or Atonement, the feast of the Dedication of the Temple, etc.

In the Christian Church no festival appears clearly to have been instituted by Jesus or his apostles, yet Christians have always celebrated the memory of his resurrection and numerous other feasts were introduced at an early period. At first they were only appointed to commemorate the more prominent events in the life and death of Christ, and the labors and virtues of the apostles and evangelists; but martyrs were soon introduced and by the 4th century the number of feasts had very greatly increased. Many of the festivals were instituted on pagan models and were characterized by rites similar to those which the pagans observed.

Feasts are either movable or immovable. Immovable feasts are such as are celebrated constantly on the same day of the year, among them being Christmas Day, Circumcision, Epiphany, Candlemas or Purification, Lady-day or the Annunciation, All-Saints', All-Souls', and the days of the several apostles, as Saint Thomas, Saint Paul. Movable feasts are those which are not confined to the same day of the year. Of these the principal is Easter, which gives law to all the rest, all of them following and keeping their proper distances from it; as Palm Sunday, Good Friday, Ash Wednesday, Sexagesima, Ascension Day, Pentecost and Trinity Sunday. Besides these, which are general, there are others which are local or occasional, enjoined by the magistrate or voluntarily set on foot by the people, such as in the United States, Independence Day, celebrated annually on the 4th of July, and Thanksgiving Day, also held every year on a day set apart by the President for the occasion.

FEATHER, one of the elastic horny dermal outgrowths of the skin, forming plumage, the characteristic covering of birds. See PLUMAGE.

FEATHER BUNCH-GRASS (*Stipa viridula*), a rather slender grass, one to three feet high, growing in the Rocky Mountain region and on the foot-hills and mesas, from British Columbia southward to Mexico and westward to the coast. On good land, under irrigation, this grass attains the height of three feet or more, and is by far the most valuable of the *Stipas* for hay. The leafy culms are terminated by a narrow, many-flowered panicle of comparatively small and rather short-awned spikelets. The seed may be easily gathered. The callus at the base of the fruiting glume is short and barely pointed and not produced into a long, very sharp, spur-like extension, as in porcupine-grass.

FEATHER RIVER, a river of California, rising in the Sierra Nevada and flowing southwest and south through Butte County to the Sacramento River, which it joins in Sutter County, about 15 miles above the city of Sacramento. It has a total length of 200 miles but is navigable only about one-sixth of that distance.

FEATHER-STAR, a crinoid of the existing family *Comatulida*, which is composed of several genera of highly developed crinoids which differ from the «stone-lilies» and other existing forms in swimming freely as adults instead of being rooted by a stalk. The headquarters of the family is in the Malayan seas, but several species occur on the American and British coasts, and one of the latter, the rosy feather-star (*Antedon rosaceus*), has been exhaustively studied, contributing greatly to our knowledge of the whole group. It has the general characteristics of a crinoid (q.v.), and when young is attached to a long stalk, but when full grown drops off and thereafter creeps and swims about, back downward, by means of five pairs of radiating arms which are so fringed and flexible that they look like feathers. These arms expand about three inches.

FEATHER-TRACTS, one of those regulated spaces where feathers grow on the body of a bird, the arrangement of which is various and characteristic of groups. This regular distribution of feather-growths is known as «pterylosis,» and the study of it as «pterylography.» Pterylosis is further treated under PLUMAGE.

FEATHER-WINGS, a plume-moth (q.v.).

FEATHERING FLOAT, the paddle or float-board of a paddle-wheel, so arranged as to turn on an axis to present its broad side to the water at its lowest submergence, but to turn its edge to the water in entering and emerging.

FEATHERING PADDLE-WHEEL, a wheel whose floats have a motion on an axis, so as to descend nearly vertically into the water and ascend the same way, avoiding beating on the water in the descent and lifting water in the ascent.

FEATHERING PROPELLER, an invention of an Englishman, Maudslay, in which the vanes of the propeller screw are adjustable, so as even to be turned into the plane of the propeller-shaft and offer no resistance when the vessel is under sail and the propeller not used.

FEATHERS, Artificial. Artificial feathers have long been made in the United States. It is probable that the industry was brought here by French immigrants, who had fled from their own country. The number of French people here was soon increased by those who had come hither from the island of Haiti, and one of the first industries they took up was artificial flower and feather making. This work was, more correctly, the artificial grouping and coloring of natural feathers. As long ago as 1840 there were 10 manufacturers in this line in New York. No separate enumeration of these products appears in the early census returns, but the quantity demanded increased greatly. New York has from the first been the principal seat of the industry.

Less than 10 per cent of the ostrich feathers and tips used in the decoration of ladies' hats are of sufficient elegance in their natural state to be marketable. The practice is to combine three or four natural feathers to produce one of the ordinary plumes sold in the shops, and a very fine one requires six natural feathers. In the making over process the quills of all the feathers except the lowermost are cut away or shaved down and the pile of feathers being assembled so as to give the richest effect, the stems of all are made into one by sewing and tying. A wire is sewed into the artificial stem and it is by this that the plume is given its proper curve. The flues are then curled by drawing over a square edge in a fashion peculiar to feather curlers and requiring special skill. Good feather curlers receive salaries up to $50 a week. Ostrich tips are made in the same way, generally from three feathers. The «willow plumes» which were in vogue for a time were made by tying the flues stripped from one feather to the tips of the flues of another. With the finest of this type a second rank of ties was made, making the finished flues three times their natural length.

In the making of boas the feathers are sewn so as to lap over one another in strings up to from one yard to three yards in length. These sewn strings are twisted over a steaming kettle until they have the required shape, and the flues are then curled as described above. See FEATHERS.

FEATHERSTONE, England, town of the West Riding of Yorkshire, six miles east of Wakefield, on the Lancashire and Yorkshire Railroad. Coal-mining is the principal industry. On 7 Sept. 1893 serious riots occurred in the town incident to a strike of the miners. Some of the colliery works were destroyed and two miners were killed by the military. The Local government board approved a proposition in 1912 having for its object the erection of workmen's cottages. Pop. 14,377.

FEATHERSTONHAUGH, feth'ėr-stŭn'hâ, **George William,** English traveler in America: b. 1780; d. Havre, France, 28 Sept. 1866. He made geological surveys in the West for the United States War Department 1834–35, and was appointed by Great Britain a commissioner to determine the northwestern boundary between Canada and the United States, under the Ashburton-Webster treaty. He was the author of numerous technical reports and papers, including the 'Geological Report of the Elevated Country Between the Missouri and Red Rivers' (1834); 'Excursion Through the Slave States' (1844); 'Canoe Voyage to the Minnesota' (1847), etc.

FEBIGER, fĕb-ĭ'gėr, **John Carson,** American naval officer: b. Pittsburgh, Pa., 14 Feb. 1821; d. Londonderry, Pa., 9 Oct. 1898. He was appointed a midshipman in the navy in 1838; became commander in 1862, and was assigned to the steamer *Kanawha* of the Western Gulf blockading fleet. On 5 May 1864, while in command of the *Mattabeset,* of the North Atlantic fleet, he participated with the little squadron under Capt. Melanchthon Smith in defeating the confederate ram *Albemarle,* in Albemarle Sound, N. C., and was commended for his bravery and skill in that engagement. He was promoted rear-admiral in 1882.

FEBRIFUGE, feb'rĭ-fūj, a remedy used to destroy or mitigate fever. When rise in temperature was considered the important feature of a disease and this single symptom was considered apart from the rest of the life history of a disease process, febrifuges were much in use, but at the present time, when a disease is considered in its entirety rather than from its purely symptomatic manifestations, this class of remedies has fallen into a position of less prominence. High temperatures are now looked upon as evidences of a reaction in the body in its struggle with disease and, unless excessive and prolonged, should not necessarily be interfered with. A temperature of 103° to 104° F. is rarely harmful, but when the thermometer registers above 104° F. it is advisable to reduce it, for which purpose cold packs and cold sponging are among the best means. Such drugs as the newer synthetics, acetanilid, antipyrine, phenacetin, salol and other like derivatives, and aconite, diaphoretics, etc., are still much in use; but only within restricted limits may they be said to be curative. In malaria, the high temperature being due to the development of large numbers of parasites in the blood, quinine, by killing the parasites, destroys the fever. In typhoid fever and in pneumonia cold water is the best febrifuge. See ANIMAL HEAT; ANTIPYRETICS; FEVER.

FEBRILE. See FEVER.

FEBRONIANISM (from Justinus Febronius, a pseudonym assumed by John Nicolaus von Hontheim, archbishop of Trèves), a system of doctrines antagonistic to the claims of the Pope, and asserting the independence of national churches, and the rights of bishops to unrestricted action in matters of discipline and church government within their own dioceses. Febronianism is opposed to Ultramontanism (q.v.), and developed into the Old Catholic Movement. See GALLICANISM.

FEBRUARY, n. fĕb'rō-ėr-ĭ [L. *Fĕbrŭārĭŭs,* the month of expiation, from *fĕbrŭŭm,* an expiation]: second month of the year; having ordinarily 28 days, but in leap-year having an additional or intercalary day. Among the Romans, it had originally 29 days in an ordinary year, but when the Senate decreed that the eighth month should bear the name of Augustus, a day was taken from February, and given to August, which had then only 30, that it might not be inferior to July. The name is derived from the fact that during this occurred the Roman festival called the Lupercalia, and also Februalia, from februare, to purify. See CALENDAR.

FEBRUARY REVOLUTION, The, in French history, the revolution of 1848, which brought about the fall of the July monarchy. See FRANCE.

FEBVRE, Alexandre Frédéric, äl-ek-sŏṅ-dr frā-dā-rik fevr, French actor: b. Paris 1835. He was a musician till he was called above the footlights to fill, it is said, an accidental vacancy. He made his début at Havre, subsequently appearing in Paris at the Beaumarchais, the Porte Saint Martin, the Gâite, the Odéon and the Ambigu theatres. He was very successful in comedy, among his principal creations being Clarkson in ‘L'Etranger’; Kobus in ‘L'Ami Fritz,’ and Bourdon in ‘Les Corbeaux.’ He went to London with a company in 1877, making his farewell appearance at the Théâtre Français in 1893, «touring» the principal cities of Europe in 1894, and was sent to the United States to study the drama here in 1895. He is the author of ‘Album de la Comédie Française’ (1880); ‘Au bord de la scène’ (1889); ‘L'Heritage de Mme. Naudin’ (1893); ‘Le Journal d'un comédien’ (1896); ‘La clef des champs’ (1899); ‘Le roman d'un m'as-tu-vu.’

FÉCAMP, fā käṅ, France, town in the department of Seine-Inférieure, at the mouth of a stream of the same name on the English Channel, 23 miles northeast of Havre. It stretches along a narrow valley enclosed by two parallel ranges of hills. It has a parish church, which originally belonged to the famous abbey of Fécamp founded in the 12th and 13th centuries, in which the painted glass, carved woodwork and monuments are notable features; also a school of hydrography, manufactures of textiles, sugar works, tanneries, oil works, a valuable fishery and a spacious harbor with deep water and good anchorage. The town was celebrated for its herring fishery as early as the 13th century. Pop. 17,383.

FECHNER, Gustav Theodor, goos-tăf' tā'ō dōr fĕн'nĕr, German philosopher: b. Gross-Särchen, Prussia, 19 April 1801; d. Leipzig, 18 Nov. 1887. His monumental and epoch-making work ‘Elements of Psychophysics’ (1860) marks him out as the founder of modern pyschology and psychophysics. He published an enlarged translation of Biot's ‘Text Book of Experimental Physics’ (1828) and his ‘Three Motives and Grounds of Faith’ (1863). Under the name of «Doctor Mises» he appeared in another and not less characteristic rôle, as a writer of poems and various popular humorous and satirical works, notably, ‘A Proof that the Moon is Made of Iodine’ (1821); ‘Comparative Anatomy of the Angels’ (1825); and ‘The Little Book of Life After Death’ (1836). Consult Kuntze, ‘Gustav Theodore Fechner, ein deutsches Gelehrtenleben’ (1892); Lasowitz, ‘Gustav Theodor Fechner’ (1896).

FECHTER, Charles Albert, sharlz äl-bār fĕн-tĕr, French actor: b. London, 23 Oct. 1824; d. Quakertown, Pa., 4 Aug. 1879. His father was a German, his mother of Piedmontese extraction. He made his first public appearance in 1840 at the Salle Moliére, in Paris, after which he went to Florence with a dramatic company as leading juvenile. Subsequently he appeared as Seide in Voltaire's ‘Mahomet,’ in 1844; as Valère in Molière's great comedy; and as the original Armand Duval in ‘La Dame aux Camelias’ made his greatest triumph in France. In 1860 he went to London, where he presented ‘The Corsican Brothers,’ ‘Don César de Bazan,’ and ‘Hamlet,’ the last named being one of his outstanding successes. He was lessee of the Lyceum 1863–67. In 1870 he came to the United States, opening at Niblo's Garden, New York, and playing to crowded houses, being especially popular in ‘The Count of Monte Cristo.’ His imperious and quarrelsome temper, aggravated by indulgence, led to some undignified and deplorable quarrels among his colleagues and in the press; and in 1872 he retired to the country, where he devoted himself to field sports and to his dogs, to whom he was passionately attached. In his time he was regarded as the best lover on the stage. Consult memoir by Field (1882).

FECIAL. See FETIAL.

FECKENHAM, fek'ĕn-ạm, or **FECKNAM,** fek'nạm, **John de,** English prelate: b. Feckenham Forest, Worcestershire, about 1518; d. Wisbech, Cambridgeshire, 1585. He served as chaplain to Bell, the bishop of Worcester, and to Bonner, the bishop of London, going as a prisoner to the Tower upon Bonner's fall 1549. Upon Queen Mary's accession to the throne he was made chaplain 1553, later becoming dean of Saint Paul's. He held a conference with Lady Jane Grey shortly before her execution. He became abbot of Westminster 1556, and was a member of Queen Elizabeth's first Parliament, the last mitred abbot to appear in that legislative body. Being active against the Reformation he was again sent to the Tower 1560, was released 1574, but kept under surveillance as long as he lived.

FEDERAL APPOINTMENTS. See APPOINTMENTS, AMERICAN SYSTEM OF.

FEDERAL CONTROL OF ELECTIONS. See ELECTIONS.

FEDERAL COUNCIL OF CHURCHES, an interdenominational organization composed of representatives of the various Protestant denominations. In October 1894 «The Open and Institutional Church League was formed,» and in the years immediately following held an annual conference of representatives of many denominations. Rev. Charles L. Thompson, Rev. E. B. Sanford and Rev. Frank Mason North were pioneer workers, who especially furthered the cause. There were also several State and county church federations, and other co-operative interdenominational organizations as the Y. M. C. A. and Y. W. C. A., the American Bible Society, the American Tract Society, the Evangelical Alliance and the American Sunday School Union have tended to foster co-operative work among the various ecclesiastical bodies of America.

On 12 Feb. 1900, a group of Federation workers met in the Twenty-third Street Young Men's Christian Association building in New York, and a National Committee on Federation of Churches was appointed. As the result of their work, 5–6 Feb. 1901, the National Federation of Churches and Christian Workers was held in Philadelphia. Thirteen federations were represented by delegates or members. The next meeting was held in Washington in February of the following year. The next Interchurch conference on federation met in Carnegie Hall in November 1905. This was a very important meeting and made possible the great meeting in Philadelphia held early in December 1908, which perfected the organization of the Federal Council of the Churches of Christ in America. Thirty denominations were represented at Philadelphia. It was decided that the body should meet quadriennially and that it should be composed of 400 delegates. In the constitution adopted at this conference the aims of the Council are clearly defined as fivefold. They are:

1. To express the fellowship and catholic unity of the Christian Church.
2. To bring the Christian bodies of America into united service for Christ and the world.
3. To encourage devotional fellowship and mutual counsel concerning the spiritual life and religious activities of the churches.
4. To secure a larger combined influence for the churches of Christ in all matters affecting the moral and social condition of the people, so as to promote the application of the law of Christ in every relation of human life.
5. To assist in the organization of local branches of the Federal Council, to promote its aim in their communities.

The body restricted its powers by refusing to assume any authority over the constituent bodies and denied itself the right of all creed-making powers. Provision was made for the admission of other Christian bodies. Each denomination represented is entitled to four delegates and to one delegate for every 50,000 members or major fraction thereof.

The Council furthered the religious work undertaken at the Panama Exposition. Under its direction the churches of Canada and the United States observed the centennial of peace with Great Britain. The next co-operative work undertaken was the 400th anniversary of the Protestant Reformation. The Council is largely co-operating in much of the war relief work. The body is now highly organized into various permanent working committees or departments, which in turn have several subcommittees. Consult Sanford, Elias B., ‘Origin and History of the Federal Council of Churches of Christ in America’ (Hartford, Conn., 1916); Macfarland, C. S., ‘The Progress of Church Federation’ (New York 1917).

FEDERAL COURTS. See COURT.

FEDERAL FARM LOAN ACT, The. The Federal Farm Loan Act, which became a law on 17 July 1916, provides for the issuance of farm loan bonds through a bureau in the Department of the Treasury at Washington for financing a farm mortgage system, covering all continental United States except Alaska. The bureau is managed by the Federal Farm Loan Board, composed of the Secretary of the Treasury, ex officio, the chairman, and four members appointed by the President by and with the advice and consent of the Senate. One of the members, designated by the President to serve as active executive officer, is called the Farm Loan Commissioner. The board must submit a report annually to the speaker of the House of Representatives.

For the purposes of the act, the country has been divided into 12 districts, each embracing whole States. The board, which apportioned these districts, may readjust their boundaries. In each district are one Federal land bank, established by the board, and such national farm loan associations as the board may deem advisable to charter. The board appoints one registrar and one or more appraisers for each district, together with such examiners, attorneys, experts, assistants, clerks, laborers and other employees as may be needed for conducting its business. The salaries of the appraisers are paid by the land banks they serve. The salaries of the members of the board and of all its appointees, except district directors, are paid by the United States. The members of the board, the registrars, appraisers and examiners are public officers, and must not be connected with any other banking or land-mortgaging concern. All appointments and dismissals are made without regard to the civil service rules. The system enjoys a franking privilege for the mails of its bureau, besides various free services of the departments of the treasury, justice and agriculture.

A national farm loan association can be chartered only with the consent of the Federal land bank of a district. The territory may be any part of that district. The incorporators shall be 10 or more natural persons owning or about to own farm land therein. They must also be applicants for loans aggregating at least $20,000. The capital shall be divided into five-dollar double-liability shares that may be issued to and held by borrowers only. Every borrower must subscribe for shares in an amount equal to 5 per cent of his loan, and pay for the same when the loan is granted. Admission to membership after the incorporation requires a two-thirds vote of the directors. The capital may be increased from time to time for the purpose of issuing new shares for the obligatory subscriptions of borrowers. The shares of every borrower shall be held as collateral security for his loan and be paid off and retired upon its full payment. As a result the capital is variable, but can never be less than 5 per cent of the outstanding loans. Members cannot cast more than 20 votes each. They shall annually elect five or more directors for the term of one year, who shall elect a president, vice-president, a loan committee of three and a secretary-treasurer. All officers, but the latter, and all directors shall be members and so shareholders and borrowers. They must also be residents of the territory.

The powers of a national farm loan association are: To endorse and guarantee mortgages taken from its shareholders by its Federal land bank, all defaults to be made good within 30 days after notice; to receive funds from said land bank to deliver to the mortgagors; to acquire such property, real or personal, as may be necessary or convenient for conducting its business; and to issue certificates against deposits, bearing interest for no longer than one year at not to exceed 4 per cent per annum. Such certificates are convertible into farm loan bonds, when presented in any multiple of $25 to said land bank. The deposits must be forthwith transmitted to said land bank. Any national farm loan association, desiring funds to lend to a member, must subscribe for capital stock of its Federal land bank to an amount equal to 5 per cent of the proposed loan. However, should the association want any money for current expenses, it may borrow back one-fourth of such stockholdings as an advance bearing 6 per cent per annum and repayable only from dividends belonging to it.

Besides the two-thirds vote of the directors, the granting of a loan requires the unanimous consent of the loan committee and the approval of some appraiser of the district. If any director or member of the committee be interested in a loan, the directors shall appoint a substitute to serve in his place. All loans shall be secured by first mortgages on farm land within the territory. None may be made except for purchasing or improving the mortgaged property, for purchasing equipment, fertilizers or live stock reasonably necessary for its operation, or for liquidating indebtedness of the owner incurred for such purposes. But the purpose is immaterial, if the indebtedness existed before the association was formed. The amount in no case shall be less than $100 or more than $10,000, or over one-half the land's value, plus one-fifth the value of its insured permanent improvements. Payment shall be by annual or semi-annual instalments, including interest at a rate not to exceed the rate of the last series of farm loan bonds in the district, plus a charge for administration and profits at a rate not to exceed 1 per cent per annum on unpaid principal, and such amounts to be applied on the principal as will extinguish the debt within an agreed period of not less than five nor more than 40 years. No prepayments are allowed until five years after the loan has been granted. After that, the borrower has the right to make payment in whole or in multiples of $25 at any regular interest date.

The borrower must cultivate the mortgaged property, pay all taxes, liens, judgments and assessments against it, keep its improvements insured and promptly pay his instalments or be liable to foreclosure. Defaults bear 8 per cent per annum. It is the duty of the secretary-treasurer to collect the borrower's dues and to see that he observes all the conditions of the contract. The association pays for the stock in its Federal land bank with funds coming from its own shares for which borrowing members have subscribed. But the association may obtain from its land bank the sum needed by any borrower to meet his obligatory subscription for shares of the association, provided such sum, when added to the principal, shall not cause the loan to exceed the prescribed credit value of the mortgaged property. Preliminary costs may likewise be added to the principal and obtained in the same way, provided such addition shall not increase the loan above any of the prescribed limits. The association may retain one-eighth of 1 per cent semi-annually upon the unpaid principal of every loan, as a commission to be deducted from dividends belonging to it in its land bank. The stock held by the association in the land bank shall, like the shares held by the borrowers in the association, be paid up in cash and shall be paid off and retired upon full payment of the loans it represents.

Each of the 12 Federal land banks had an initial capital of $750,000, divided into five-dollar non-assessable shares. But this may, upon authority of the Federal Farm Loan Board, be increased or decreased to any amount, provided it shall never be less than 5 per cent of the aggregate of bonds in circulation. Most of it was subscribed by the Secretary of the Treasury for the United States, without right to dividends. But the retirement of all such government holdings is to be gradually brought about by stock contributions of borrowers. Although any individual, firm, corporation or State may be a stockholder, only the Federal Farm Loan Board and national farm loan associations may vote. The board appoints for each Federal land bank three district directors, one of whom must be a farmer; the national farm loan associations that hold stock as a result of the loan operations elect six local directors. These nine elect a president, a vice-president, a secretary and a treasurer. All directors must be residents of the district.

Each Federal land bank may acquire such property, real or personal, as may be necessary or convenient for conducting its business, and rent the same in part for revenues or otherwise dispose of it. Also the land bank may receive deposits from stockholders, borrow money at interest and give security therefor, buy and sell bonds of any other Federal land bank or of the United States and deposit its securities and its current funds subject to check with any member bank of the Federal reserve system. But its chief function is to buy mortgages on farm lands within its district through national farm loan associations, and to issue and sell its own bonds in order to raise funds for this purpose. Should its district not be adequately served by such associations, it may then buy the mortgages upon the endorsement and guaranty of any bank, trust or mortgage company, or savings institution chartered under State laws and approved as an agent by the Federal Farm Loan Board. The outstanding mortgages so guaranteed by such an agent shall never exceed 10 times its own capital and surplus, while the mortgagors shall make a direct contribution to the stock of the Federal land bank in an amount equal to 5 per cent of their loans. A commission of one-half of 1 per cent per annum upon the unpaid principal may be given to the agent and deducted from dividends belonging to the mortgagor. The only mortgages allowed are of the kind described above, but no act in excess of powers shall invalidate any loan or mortgage.

The bonds of each Federal land bank shall be prepared and engraved by the Secretary of the Treasury in registered and unregistered denominations of $25, $50, $100, $500 and $1,000. They shall run for specified minimum and maximum periods, subject to retirement at the land bank's option five years after date, and be payable at par in gold or lawful money with terms prescribed and with interest fixed by the Federal Farm Loan Board, at a rate not exceeding 5 per cent per annum, for which semi-annual coupons shall be attached. The bonds may be issued only upon the authority of said board in series of $50,000 or more; and each shall contain on its face a certificate signed by the farm loan commissioner to the effect that it is issued and secured according to law. Their security shall be at least equal to them in amount and consist either of cash, United States bonds or farm mortgages, approved by the appraisers and trusteed with the registrar of the district. The bonds and any mortgages executed to the land banks are instrumentalities of the United States government. The bonds may be bought and sold by member banks and, with certain restrictions, by the reserve banks of the Federal reserve system, while they are lawful as security for public deposits and as investment for funds in the hands of fiduciaries and trustees acting under Federal authority. So far 29 States have allowed them similar privileges. The borrower may demand bonds instead of cash for his mortgage.

A Federal land bank shall not obligate itself for outstanding bonds in excess of 20 times its capital stock and surplus, nor buy from any national farm loan association additional mortgages when the unpaid principal of the ones already purchased exceeds 20 times the association's holdings of its stock. Each Federal land bank must guarantee the bonds of the other Federal land bank, and reimburse the Secretary of the Treasury for that part of his expenses incurred in its behalf. All mortgages executed to it and also its bonds, with their income, are exempt from Federal, State, municipal and local taxation. Its franchises, capital stock, reserve or surplus, and income derived therefrom are likewise exempted, except taxes on real estate. This is also the case with national farm loan associations. Real estate taken to secure a debt cannot be held for longer than five years except with the approval of the Federal Farm Loan Board.

A reserve, equal to one-fifth of capital stock, must be created by each Federal land bank by semi-annually carrying thereto one-fourth of net earnings until that proportion shall have been reached, and thereafter by setting aside 5 per cent of net earnings for such purpose. Defaults on mortgages must be carried to a suspense account and at the end of two years, unless collected, shall be debited to reserve. Every national farm loan association must use 10 per cent and then 2 per cent of net earnings in the same way, in order to create a reserve equal to one-fifth of its capital. No limit is set for dividends after such allocations have been made. Reserves shall be invested in accord with rules prescribed by the Federal Farm Loan Board. In the event of voluntary dissolution, the reserves are subject to the disposal of said board, except that of an association becomes the property of its land bank. But no voluntary dissolutions are lawful without the consent of said board. At least one-fourth of the stock of a Federal land bank that is held by its associations must be kept in quick assets, of which 5 per cent or more shall be United States bonds.

The Federal Farm Loan Board has power, without intervention of the courts, to place any Federal land bank or national farm loan association in bankruptcy and wind up its affairs, in case of a failure to meet outstanding obligations. But no association can be declared insolvent until the total defaults on loans endorsed by all associations in the district shall amount at least to $150,000, unless such association shall have been in default for two years. Any moneys collected by the receiver must be turned over to the United States Treasurer to be held by him subject to the order of said board. Severe penalties are imposed for any offenses committed against the system. Any borrower that knowingly makes a misstatement in his loan application, and any examiner, public or private, that discloses, without authority of the courts or Congress, the name of any borrower is liable to fine and imprisonment.

The act also authorizes the Federal Farm Loan Board to charter joint stock land banks, to be organized with the powers and subject to the requirements above set forth, so far as they are applicable, with a few exceptions. Every joint stock land bank may have a territory of not more than two contiguous States. The capital stock shall be at least $250,000, divided into double-liability shares. The United States shall not be a shareholder nor select any of the directors. The number of these shall be five or more, to be elected annually. The loans may be made without any restriction as to purpose, use or amount, or as to interest, except the rate shall not exceed by more than 1 per cent the rate borne by the latest series of bonds. Borrowers need not become shareholders. The bonds must be distinctive in form and color, but are not to be certified by the farm loan commissioner nor guaranteed by other land banks. The bonds, with the mortgages, have all the other privileges and the governmental quality prescribed for those of the Federal land banks.

The Secretary of the Treasury may designate either kind of bank to be a depository of public money, except receipts from custom, or employ it as a financial agent of the United States government. But public funds so deposited shall not be invested in farm mortgages or farm loan bonds. However, the Secretary of the Treasury may deposit any not otherwise appropriated funds with the Federal land banks for their temporary use, provided the aggregate of the sums so deposited shall not exceed $6,000,000 at any one time. Each Federal land bank may issue certificates against sums so received, bearing a rate of interest not to exceed the current rate charged for other government deposits, to be secured by farm loan bonds or other collateral, and redeemable at the Secretary's discretion.

Federal land banks are located at Springfield, Mass., Baltimore, Md., Columbia, S. C., Louisville, Ky., New Orleans, La., Saint Louis, Mo., Saint Paul, Minn., Omaha, Neb., Wichita, Kan., Houston, Tex., Berkeley, Cal., and Spokane, Wash. The government subscribed for $8,891,270, and private investors subscribed for the remaining $108,730 of their capital stocks. Up to 1 Aug. 1918 charters had been granted to 3,108 national farm loan associations and $117,249,000 loaned among 51,000 farmers at 4½ and 5 per cent interest per annum for 36 years. The bonds bear 4½ and 5 per cent interest per annum and run for 20 years. The board had also chartered five joint stock land banks, and approved four banks organized under State laws as agents of the Federal land banks.

On 18 Jan. 1918 the Federal Farm Loan Act was amended so as to authorize the Secretary of the Treasury to purchase at par $200,000,000 of bonds of the Federal land banks within that year and the next. The amendment also provided that, as long as that official holds any of the bonds or the majority of the stock of any Federal land bank, its management shall remain in the hands of the government. Several of the land banks in the west received, as the government's financial agents, the funds set aside by the Secretary of the Treasury to relieve distress on the Great Plains during the war, and made loans therefrom without real estate security to impoverished farmers. See BANKS AND BANKING — FEDERAL RESERVE SYSTEM.

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FEDERAL FARM LOAN BOARD, a board which, according to the provisions of the Federal Farm Loan Act, has control of a system of National land banks. See BANKS AND BANKING; FEDERAL FARM LOAN ACT, THE.

FEDERAL GOVERNMENT. Origin of Federation.— The first types of human government were groups of a few people — a family or a tribe. In the course of time larger units were formed with a single government by races and regional groups, such as the kingdoms of Egypt and Assyria. The next step was a system of composite governments, made up of central monarchies with dependent provinces, of which the Roman Empire was the greatest example.

These big centralized powers sought to overwhelm and annex their small neighbors; and this pressure led to the first crude forms of Federal government, in which small and weak units united in a union which could protect its members from outside aggressions, while leaving each free to carry on its own local affairs in its own way. This middle type, which preserved the individuality of small states while securing some of the military power and resistance of great states, appeared first among the Greeks, from whom sprang so many fruitful ideas in government.

Inasmuch as the usual type of a Greek state was a city, the Greek federations were mostly unions of cities, such as the Lycian group in Asia Minor, the Amphictyonic Council and the Achæan Confederation. In one case, the Delian League, Athens secured the leadership and pressed the sister states so hard that at last they revolted. The most famous of the Greek Leagues were two: the Ætolian, made up of a group of mountain tribes, north of the Gulf of Corinth; and the Achæan, which was the best organized, strongest and longest lived. Twelve cities, including Corinth, came into this federation about 274 B.C.; and it lasted till crushed by the Romans in 146 B.C. No efforts availed, however, to induce all the Greeks to unite in a similar union, which might have saved them from conquest.

The same idea of unions of city states appeared among the Etruscans and Latins in Italy, and Rome itself was in its early days a member of a league of 30 towns; but the idea of a world state overbore the federal theory; and the Roman Empire revived the ancient idea of a central state, with a vast empire of dependent provinces. Out of the ruins of Rome arose a new group of Italian cities; and there, in the 12th century, appeared the Lombard League; and similar unions were formed in the rising German cities north of the Alps.

European and American.— Both the Italian and the German unions were opposed by the German emperor, the head of the Holy Roman Empire, who strove to restore the Roman idea of an enormous centralized power. The conflict lasted for seven centuries during which the empire itself gradually lost authority till it became a loose, weak and irregular federation. Within its limits were created three other federations, the Hansa, the Swiss League and the Dutch United Netherlands, all of which were built up from small units into powerful federal unions.

The Hansa was a commercial union of manufacturing and trading cities, the main purpose of which was to control the Baltic trade. It lasted from 1367 to 1669, included about 60 cities, made treaties, established agencies and warehouses in foreign countries, built fleets and waged war.

The Swiss confederation was founded in 1293 by the mountain cantons of Uri Schwytz and Unterwalden; 50 years later five more cantons were added, including four strong cities, and later five more city and country states came in. The situation of these united Swiss in heart of the Alps gave them defense. Their own valor and skill as a powerful infantry fighting in mass made them conquerors of neighboring territory, including important valleys south of the Alps. Their success as soldiers drew the attention of the sovereigns of France, who for centuries made Switzerland a recruiting ground for their armies. They passed through the crisis of the Reformation without a breakup; and their federal government lasted till 1798.

The United Netherlands was composed of seven provinces which revolted from Spain and in 1579 united under a weak and imperfect constitution called the Union of Utrecht. Thereafter they clung together and maintained their own government till 1795. They became a great sea power, having large merchant fleets, strong navies and colonies in the eastern and the western hemisphere; but their federal government was always weak and subject to the leadership of the largest province, Holland.

The Holy Roman Empire and its two daughters in Switzerland and the Low Countries were losing ground throughout the 18th century; but their place as practice grounds for federal government was taken by an unexpected federal government in the New World. The New England colonists had formed a federation in 1643; but it had disappeared nearly a hundred years before the American Revolution. In 1775 the second Continental Congress practically formed a confederation composed of the 13 colonies which joined in the Revolution. It made war, created a national debt, issued paper money, made rules for naval warfare and on 4 July 1776 took the responsibility of announcing that "these united colonies are and of right ought to be free and independent states." Furthermore it framed a form of federal government under the name of Articles of Confederation, which was adopted by all the States and went into force in 1781.

This constitution proved too weak and was replaced by the Federal Constitution of 1787, which went into effect in 1789 just as the French Revolution was rising; and that Revolution gave the finishing touch to the three decaying European confederations. The new Federal Constitution was the most elaborate and effective federal document that had ever been drawn, and with a few amendments has answered the needs of the nation during a century and a quarter.

Nineteenth Century Federation.— After the Napoleonic wars Switzerland was admitted by the Great Powers to form a federation which included several cantons that had not been a part of the old union. Germany, also, was reorganized under what was called the Germanic Confederation, which was really a device for enabling Austria to dominate central Europe. The Revolution of 1848 caused the Swiss to reform their constitution, following closely the lines of that of the United States of America. The Germans also in 1849 made a desperate attempt to create a Federal empire with the king of Prussia at the head; but the difficulties could not be surmounted and Austria resumed the leading part.

The American Civil War gave a proof to the world of the ability of a great federation to maintain itself in the face of a formidable rebellion; and that was the signal for two additional federations, both of which freely used the results of American experience. The Canadians in 1867 secured from Great Britain the North America Act, by which the former colonies were authorized to unite in a Dominion of Canada. Within a few years all the British possessions in that part of the world, except Newfoundland, came into this union, which thus extended from ocean to ocean.

The Swiss in 1874 again revised their constitution, in the direction of greater power for the central government; but the great federal event of this period was the creation in 1867 of the North German Union, which in 1871 was converted into the German Empire. Hungary and all the German population in Austria were shut out of this new combination, and formed a dual union having some federal features. The head and front of the German Empire was Prussia with more than half the territory and about two-thirds of the population of the whole empire; the Hohenzollerns as kings of Prussia became also German emperors. The Imperial Constitution in some ways much resembles the American; but is more centralized, especially in its powers over justice, commercial transactions and transportation; and in war is practically supreme over all the states and their people. The American system of universal manhood suffrage was adopted for elections to the Reichstag.

The success of federation in Canada led to its adoption in the growing communities of Australia and South Africa. After a discussion which lasted nearly 40 years, and several conventions, a federal constitution was finally agreed upon by the Australians and went into force in 1900. It includes the five provinces of the continent of Australia and the Island of Tasmania. The Australians secured from the British government a fundamental act under which the Supreme Court of Australia may make certain decisions which cannot be appealed to Great Britain.

South Africa was in a state of confusion from the time of the conquest of the Cape Colony from the Dutch in the Napoleonic Wars. Then the Dutch colonists of Transvaal and Orange Free State set up independent states and the British overcame those two states in the Boer War from 1899 to 1902. In 1909 these two colonies, which had been reorganized, together with Cape Colony and Natal united in the union of South Africa. The constitution is decidedly more centralized than that of any of the other five active confederations of the world.

Several Latin American states — Mexico, Central America, Venezuela, Colombia, the Argentine and Brazil — have had, and most of them still have, the outward forms of a federal government; but the two last named are the only ones that approach the federal spirit or the federal methods of actions, as shown in the other governments of the world.

Nature of Federal Government.— This long experience of federal government, which has been continuous in one part of the world or another for 700 years, has brought out clearly the advantages and conditions of federal success and the drawbacks of the federal system as compared with the unitary system. In fact some federations, such as South Africa, are little more than one state divided into districts which enjoy self-government upon some subjects. Thence the character of the federation varies till at the other pole may be found a government like the Confederation of the United States from 1781 to 1788 — a group of states which have committed certain general functions to a central authority..

An effort has been made by German publicists to classify federations into the two types of staatenbund and bundesstaat — league of states and federal state. The importance of this classification is that it calls attention to the relative influence of the two forces, centrifugal and centripetal, which act against each other in every combination of states.

It is impossible to bring all the various federations within these two types; some writers have set up a third type, the staatenstaat or union of states, thereby intending to set apart combinations in which the federal tie is strong but concerns itself with communities and not with individuals. There is no fixed criterion for deciding whether a given composite state is a weak centralized power, a true federation or a live combination of small sovereign states. The Austria-Hungarian Empire with its sharp division into two great states, each of which is made up of several communities, which are neither states nor administrative districts, cannot be brought within any of the common definitions of federal government, yet is certainly not unitary.

All federations attempt to make their status clear by a formal subdivision of the powers of government between the national and the state governments. The lack of clearness and definiteness in this regard is one of the main reasons for the decay of the mediæval confederations, all of which had constitutional documents, but none of them a well-jointed division of powers. In the 18th century the presumption was that all governmental powers were vested in the states, unless the federation could point to specific grants of power. This principle was carried over into the Federal Constitution of the United States; only here the specific grants were large and included independent authority over foreign affairs, war, finance and commerce. The principle that the federal government has only delegated powers is also that of the Swiss and German constitutions. In the Canadian colonial federation, however, the opposite principle was adopted: the Dominion exercises all the powers that are not specifically assigned to the provinces; and this principle is less explicitly followed in the South Africa constitution; while the Australian enumerates 39 federal powers which include a great part of the field of government.

Power over Individuals.— One of the distinctions drawn between a staatenbund and a bundestaat is that the former establishes relations between the central government and the states as units; while the latter type includes also direct governmental relations with individuals, such as the obligation of military service, of taxes and in some federations of direct responsibility to the civil and criminal laws of the federation. Furthermore all the federations have a federal citizenship, which includes federal control of naturalization and over aliens. Some relics of state citizenship are still to be found, such as the protection of the persons and property of aliens by our state governments instead of the national governments. In general, however, all federations have the acknowledged power to compel the allegiance and service of all citizens within their boundaries. This includes authority over immigration in all the existing federations, which is vital in the American and British colonial unions. Race questions, such as the status of negroes and Asiatics, are also decided by the federal governments.

Foreign and War Powers.— Two fields of authority in which the federations go far are foreign relations, and war and defense. In all federations worthy of the name, external relations are in the hands of the central power, which makes treaties, commissions diplomatic representatives and decides upon a foreign policy. Several of the German states still have the nominal right to send ministers and consuls, but they do not exercise it. In the three British colonial federations, the foreign powers are in the hands of the home government, but it has become the practice to call in a representative of the federations in negotiations which especially concern them, and to consult their interest in treaties.

The strongest motive for the grouping together of previously independent or separate states is defense. This was the reason for the original United States of America of 1776 and is the binding force in Switzerland and Germany. Hence all the federations have a central system of armies, navies and war. Only one federation, the United States, leaves to the states any considerable share in organizing and training soldiers; and that could be altered by an act of Congress. In practice, these federal forces are much more effective than any combination of state armies could possibly be; and the effect of war in federations is always to give additional strength and weight to the central power.

Finance and Commerce.— The federations are all organized upon the idea that the states remain free to lay internal taxes for their own governmental purposes, including local and municipal taxes, and also to incur public debts; but certain fields of taxation are everywhere withdrawn from the states, particularly import duties. Where the federation and the states both tax the same thing, as for instance the American income taxes, the federation has the first right to share in the proceeds. In addition, all the federations have a machinery of federal taxation almost without limit, and they all have federal debts which in every case were much enlarged during the European War.

Commerce is in general a federal concern, except that in the United States the States have a recognized right to the control of movements of persons and commodities which begin and terminate within the same State. In all the federations the general commerce from state to state and from any part of the confederation to a foreign country is controlled from the centre. This involves shipping and railroads. Three of the federations, Australia, Switzerland and South Africa, have entered on the policy of national ownership of the whole network of railroads; and all the others exercise a strong governmental control over the railroads, including a few federal owned lines. Several of the federal governments also have granted subsidies to steamer lines, and the United States has entered upon a new system of government merchant steamships.

The tendency everywhere is for federal governments to gain power as against the states; partly because what might be called the natural federal powers, such as have just been discussed, enlarge with the growth of business, commerce and international relations; partly by constitutional amendments which transfer areas of power to the central authority; and partly by changes of public sentiment which permit the central governments to exercise powers which were earlier considered to be reserved for the states. An example is the growth of national legislation on labor in the United States. An example of the centralizing effect of the larger exercise of national powers is the effect on Germany and the British colonial federations of the Great War of 1914. The combined powers over war, finance and commerce gave to the federal governments a power and pre-eminence which could not all be resumed by the states after war was over.

Coherence of Federations.— The books mention many reasons for the building up of federal governments — such as common origin in the states, which combine common language, common religion and common race. None of these unities of feeling are essential. Switzerland has three official languages; in Germany there are three state religions; the United States is made up of a score of races. Yet no federation can long exist unless the people of the various states are accustomed to the same general system of law, government and civilization. Granting these, states will adhere to each other in a federation, if they find in it a protection for their interests and a security from foreign attack which makes the federation stronger and safer than any of the members could be by themselves.

Modern federal governments have passed through some terrible shocks. In 1846 in the Sonderbund Krieg, an unsuccessful attempt was made by part of the Swiss cantons to form a separate union. In 1861 a third of the United States threw off their connection with the Federal government and formed the separate Confederate States of America. In 1867 Prussia went through the forms of secession from the old Germanic Confederation. In each of the three cases the struggle was followed by a much stronger sentiment of union which included the communities that had tried to withdraw.

The success of the United States government in breaking up the Southern Confederacy was a proof to the world of the ability of a well-organized confederation to meet the issue of civil war. It was also a setback to the constitutional theory that states can enter a federal union, reserving to themselves the constitutional right of withdrawing whenever they felt that they would be better off outside the union. Such a principle once admitted by a federal nation would make of its constitution and government what Washington called the American Confederation—"a rope of sand."

The principle of federal government has made great headway during the last 60 years. It made possible Germany and the British colonial unions. In many ways federation eases the shocks of government in a great country, by taking contested questions out of the national legislature and thus allowing for differences of feeling in the different parts of the union. The British people have for some years been considering a plan of Imperial Federation, a scheme which was further brought to the front by the war. Various suggestions have also been made for a World Federation, which would look after international commerce and keep the peace of the world. Such a combination of great empires would go far beyond the principles which have been worked out in any existing federation. See CONSTITUTION; DEMOCRACY; EXECUTIVE; GOVERNMENT; SOVEREIGNTY; UNITED STATES: ARTICLES OF CONFEDERATION—GROWTH OF GOVERNMENTAL MACHINERY—THE INTERPRETATION OF THE CONSTITUTION—STATE CONSTITUTIONS.

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FEDERAL HALL, New York city, originally the City Hall, built 1699 in Nassau street, to replace the old Dutch "stadt-huys." It had a cage in front for criminals, a whipping-post and stocks. On the assumption of independence it was made the State capital; the Declaration was read in front of it and Washington was inaugurated on its steps 30 April 1789. In 1836 it was torn down and the sub-treasury building erected on its site.

FEDERAL HORTICULTURAL BOARD. See AGRICULTURE, DEPARTMENT OF.

FEDERAL PURE FOOD AND DRUG ACTS. See PURE FOOD ACTS.

FEDERAL RESERVE LAW. See BANKS AND BANKING—FEDERAL RESERVE SYSTEM.

FEDERAL AND STATE BOUNTIES. See BOUNTIES.

FEDERAL STATES. See FEDERAL GOVERNMENT.

FEDERAL THEOLOGY, a method of stating divine truth, according to which all the doctrines of religion are arranged under the heads of certain covenants (*foedera*) which God has made with men. As a type of Calvinism it developed in Holland in the late 17th century and from there spread to England. John Koch (Cocceius) was its chief exponent. He termed a covenant a promise on God's part hypothecated upon man's obedient acceptance thereof. As developed, this method included the covenant of works or of nature made to Adam upon condition that he remain in his pristine state of holiness in return for which eternal happiness would be his portion. This covenant was broken by Adam's fall and was superseded by the Covenant of Grace, under which man was still held to obedience, and being incapable of it, God substituted grace for good works. Christ the Son of God is sent on earth to supply the obedience of which man is no longer capable since the fall. This covenant includes three periods—the ante-legal, or that promised the patriarchs; the legal, or the Mosaic law, which are symbolical, and the post-legal, which comprises the advent of Christ on earth and all subsequent Christian history. The orthodox Calvinists opposed Koch and his followers because their system dwelt little on predestination and he narrowly escaped persecution. However, they broke away from a formal scholastic Protestantism and directed a closer approach to the Scriptures. Consult Cocceius, 'Opera Omnia' (Amsterdam 1675; 1701); Fisher, 'History of Christian Doctrine' (New York 1896); Zoványi, 'Geschichte des Coccejanismus' (Budapest 1890).

FEDERAL TRADE COMMISSION. This commission was created by the act of 26 Sept. 1914, in order to provide more expeditious methods of compelling observance of the Anti-Trust laws of the United States. Suits in equity for decrees to dissolve unlawful combinations were long-drawn out and final orders enjoining restraints of trade could not be obtained, nor could the penalties provided by the Sherman act for violations be enforced until the cases had been successively reviewed by the Circuit Court of Appeals and the Supreme Court of the United States. Moreover, the Sherman act is a penal statute, and commercial practices, not criminal in their nature nor in their intent, might nevertheless be destructive of competition and contrary to public policy. The act of 26 Sept. 1914 declared "unfair methods of competition in commerce" to be unlawful. The act was intended to be regulative rather than punitive; accordingly the Federal Trade Commission was directed to *prevent* the use of such methods. Banks and common carriers, being under the supervision of the Federal Reserve and Interstate Commerce Commissions, were excepted from the provisions of the act. The Federal Trade Commission proceeds on its own initiative and, whenever it shall have reason to believe that any person, partnership or corporation has been, or is, using unfair methods of competition, and it shall appear to the Commission that a proceeding by it in respect to the matter would be in the public interest, it shall issue and serve on the party complained of a statement of charges with a notice of hearing. The party complained of has the right to appear and show cause why an order should not be entered requiring him or them to desist from the violation of law as charged. Any other person, firm or company having an adverse or collateral interest in the decision may apply, and, in a proper case, will be permitted to intervene in and become a party to the proceeding. The orders of the Commission are enforcible by the Circuit Court of the United States, which may affirm, modify or set them aside; but the findings of fact of the Commission are conclusive. The Commission may, and, on application of the Attorney-General, it must, make an investigation to discover in what manner any decree entered in an anti-trust suit has been, or is being, carried out — and it shall make a report thereon with its findings and recommendations, which it may make public at its discretion. It may publish the results of any other investigation, excepting only information obtained with respect to trade secrets and the names of customers. In like manner the Commission may investigate and make recommendations for readjustment of the business of any corporation alleged to be violating the Anti-Trust laws, in order that the corporation may thereafter maintain its organization or management and conduct of business in accordance with the law. In a word the function of the Commission is to tell the great trading and industrial corporations what they may, and what they must not do if they would escape dissolution and the other penalties of the law. The term «unfair competition» is broad enough to cover everything forbidden by the anti-trust laws, either expressly or by implication; and the activities of the Commission have almost completely superseded those of the Attorney-General in the suppression of combinations in restraint of trade. While the Commission has no direct control over prices, its powers were great enough to induce a material reduction in the prices of newsprint paper as well as a fair distribution of the available supply thereof. Regulation and «pitiless publicity» may prove beneficial substitutes for «trust busting.»

Stephen Pfeil.

FEDERALIST, The (1787–88). When the text of the Constitution was published in New York, 27 Sept. 1787, the opposition was at first overwhelming; the State held too advantageous a position, as general gatekeeper of the commerce of her neighbors and able to support herself by levying customs duties on them, to surrender it. Unless New York ratified the Constitution, there could be no Union; and New York certainly would not ratify it as things stood. Alexander Hamilton, therefore, induced James Madison and John Jay to unite with him in publishing a series of anonymous essays to defend the new instrument and urge its absolute necessity; Gouverneur Morris was asked to join, but declined. From 27 Oct. 1787 to 2 April 1788, 77 essays were published in the semi-weekly *Independent Journal* of New York, entitled, *The Federalist,* and signed first «A Citizen of New York,» then «Publius.» Eight more were added when they were collected in book form. Their influence was enormous not only in New York, where they greatly aided the final ratification by two votes, but elsewhere the essays circulated extensively in pamphlet form; they were so acute and massively learned in their exposition of the true intent of the Constitution, that even the courts have accepted them as authoritative comments in doubtful cases; and they are held by all the civilized world as among the noblest storehouses of political philosophy in existence, a classic textbook of political science. The exact authorship is matter of debate. Jay certainly wrote 5; Hamilton's son claimed 63 for his father and 3 for him and Madison jointly, leaving the latter 14, but Madison in 1819 claimed 29 for himself alone, leaving Hamilton 51. John Fiske thinks Madison's 29 much the most valuable for constitutional exposition; the Hamiltonians can claim half of them. There are many editions; the best is Paul Leicester Ford's indexed edition of 1898. In John C. Hamilton's of 1875 he has a long essay on the authorship. Other editions are those by H. B. Dawson (New York 1864), by H. C. Lodge (ib. 1888) and by E. H. Scott (Chicago 1895). On the authorship of the *Federalist,* consult Bourne and Paul Leicester Ford, in *American Historical Review* (Vol. II, New York 1897).

FEDERALISTS, or FEDERAL PARTY, in the United States; in power 1789–1801; died nationally about 1817, locally about 1823; the lineal ancestor in succession of the National Republican, Whig and present Republican parties. Its origin (see Anti-Federalists) was on the question of adopting the Constitution; but it represented two unrelated elements. The commercial interests wished protection at once from foreign aggression and from barriers set up by independent selfish State legislatures; the patriots pure and simple wished a strong and energetic nation, able to command respect and secure fair treatment. The union of these, their reinforcement for the time by the more statesmanlike even of the Anti-Federalists and Washington's influence, gave them complete control of the new government. They organized the executive departments (see Executive) anew and created the Federal judiciary and the Territorial system. Hamilton, the greatest man of the party and its natural leader, pushed through his schemes for paying the foreign and funding the domestic debt in full, restoring national credit and for assuming the State debts, binding the States to support the new government (see District of Columbia for the «log-roll» which carried it); excise laws, a United States bank, a protective tariff and bounty system to develop manufactures and agriculture, and a postal system, followed rapidly; and in 1794 the crushing of the Whisky Insurrection (q.v.) showed the new national strength. Meantime the refusal to be dragged into an alliance with revolutionary France had fused the Democrats with the Republicans, the successors of the Anti-Federalists; and Jefferson had organized and Madison joined the new Democratic-Republican party. The most influential Federalist leaders besides Hamilton were Adams and Jay; among others were the «Essex Junto» (q.v.), Fisher Ames, Roger

Sherman, Jonathan Trumbull, Rufus King, Gouverneur Morris, Jonathan Dayton, Elias Boudinot, William Bradford, James A. Bayard, John Marshall, Richard Henry Lee, C. C. Pinckney and William Smith. The party began a new navy, but was prevented by the Democrats from going on with it. This ultimately killed the Federal party; unable to protect commerce by force, it had to do so by humiliating concessions to England and thus become dependent on and an apologist for that country, which alienated public confidence. By 1796 it had become almost entirely a northern party. The French war afforded a chance of increasing the navy, which they did; but they committed the huge folly of passing the Alien and Sedition laws (q.v.), gratifying resentment at the expense of votes. Finally, when Adams took away their one issue by ending the French war (see ADAMS, JOHN), the Hamilton wing broke with his, and the Democrats ousted the party in the elections of 1800. Its course in opposition deprived it of respect; when the Democrats almost at once dropped their original tenets, practically if not theoretically, and acted on those of the Federalists, the latter (as in the Louisiana Purchase, a pure Federalist measure) changed coats with the Democrats and fought them on their own discarded ground. Their best patriotic elements deserted them in swarms and in 1804 they carried only Connecticut and Delaware and part of Maryland. But the Embargo (q.v.) and the selfish attempt of the agricultural sections to sacrifice the entire commerce of the country to their own supposed interests temporarily reinforced the Federalists; in 1808 they had every New England State but Vermont (the only one with no seaboard), besides Delaware and parts of Maryland and North Carolina. The War of 1812 was so unpopular in the North that in the elections of that year New York and New Jersey went Federalist also, and Maryland solid; and the balance of power was held by the three backwoods States of Kentucky, Tennessee and Ohio — or by Pennsylvania, whose agricultural west had now swamped the Philadelphia region. But the party as such was really dead; half the old leaders were gone, several of the others had turned Democrat or Independent, Marshall was imbedding its best principles in the national system from the Supreme bench; the chief men now were King and Pinckney. When the war closed, the issue on which the commercial sections had joined them was closed and these at once deserted the party; the Hartford Convention (q.v.) had driven all the remaining leaders out of public life with the stigma of secession and treason; and in 1816 the party carried only Massachusetts, Connecticut and Delaware, with three Maryland electors who would not vote. The scattered Federalists in Congress did not act as a party, having no issues even as a pretense, and as a national party it ceased to exist. Statewise, it controlled Connecticut and Delaware till after 1820 and Massachusetts till 1823, when the Democrats swept even Essex County from the «Junto.» It lingered for some time also in Maryland and North Carolina. Consult Bassett, 'The Federalist System' (New York 1906) and Morse, 'The Federalist Party in Massachusetts to the Year 1800' (Princeton 1909).

FEDERALS, the name given to those who during the Civil War in the United States fought to maintain the Union of the Federal States, as opposed to the Confederates.

FEDERATED MALAY STATES, a group of native states of the Malay Peninsula, comprising Perak, Selangor, Negri Sembilan and Pahang, under British protection. The total area of the federated states is 27,506 square miles, of which Perak has 7,800, Selangor 3,156, Negri Sembilan 2,250 and Pahang 14,000 square miles. Generally speaking the country is fertile and has an abundant water supply. There are several mountain peaks, some of which have an elevation of 7,000 feet. The staple cultivations are coconuts, rubber, rice, sugar, pepper, tapioca, gambier and ripah palms. The chief industrial enterprises are rubber-curing and the mining of tin. In Perak the Krian irrigation works irrigate 70,000 acres of rice-fields and supply drinking water to the entire district. The canal is 21 miles long, with branches aggregating 16⅛ miles and 188½ miles of minor channels. The total area of rubber plantations (over 100 acres) is 499,500 acres and 182,000 acres are under coconuts. The forests produce excellent timber, besides guttapercha, oils, resins and canes. About 600,000 tons of timber are taken annually from the forests, exclusive of about 120,000 tons for firewood, mining, etc. In 1916, 62,765 tons of rubber were exported; the annual exports of tin aggregate about 50,000 tons. Gold is produced also: 14,272 ounces in 1914 and 18,641 ounces in 1915. Many other minerals are found, including lead, iron, copper, bismuth, mercury, arsenic, manganese, plumbago, coal, silver and zinc. The miners number about 164,000, of whom 157,000 are Chinese.

Commerce.— The trade, exclusive of bullion and specie, was as follows in a recent year: exports, $94,405,565, imports $35,009,295. In that year the chief items of import were: rice, $8,730,400; opium, $1,037,595; tobacco and cigars, $1,721,205; cotton piece goods, $1,180,055; sugar, $934,205; condensed milk, $733,835; live stock, $1,176,690; spirits, $620,235; petroleum, $1,428,610; iron ware, $861,595; machinery, $786,190. The chief exports included rubber (44,524 tons) $54,486,825; copra, $1,072,465; rice, $525,130; tapioca, $130,995; coffee, $125,550; and tin and iron ore, $35,824,840. The exports to the United Kingdom aggregated $16,680,050, to other British possessions, $77,311,300, to other countries, $759,050.

In 1915 the shipping entered, exclusive of native craft, was 4,296 vessels of 1,714,837 tons; shipping cleared 4,290 vessels of 1,714,554 tons. Native craft entered and cleared aggregated 13,795 vessels, 311,763 tons.

Communications, Posts, Telegraphs, etc.— The four states have 2,251 miles of metaled cart roads and 1,923 miles of bridle roads and paths. The government has made, purchased, leased or is making, the railway systems of the whole peninsula south of the boundary of Siam, including the railway on Singapore Island. The system, when completed, will comprise a trunk line throughout the peninsula, diverging at Gemas in Johore into West Coast and East Coast lines, and linking up with the Southern Siamese railway system on the Perlis-Siam and Kelantan-Siam boundaries respectively. The total mileage open for traffic is at present about 1,000 miles.

There are 90 post offices and 38 sub-stations. In 1915, 17,371,312 postal packets were received and delivered. There are 2,226 miles of telegraph and telephone line under the post office department. The post and telegraph receipts, including stamp sales, excepting sales for fiscal purposes, amount annually to about $42,000, and the expenditure to $500,000. On 1 Jan. 1916 the savings banks had on deposit $375,550 credited to 7,558 depositors. The currency consists of Straits Settlements dollars with subsidiary silver and copper coins. The value of the dollar is fixed at $0.59, or 60 dollars=£7=$35. Currency notes and bank notes are also in circulation, and the British sovereign is legal tender for any amount. Weights and measures are as in the Strait Settlements.

Revenue.— The 1915 revenues amounted to $23,785,405, derived from licenses, customs dues, railways, land revenue, fees of court or office, interest, municipal fees, etc. The disbursements amounted to $24,989,200, mostly on railways, public works, miscellaneous services and personal emoluments.

Education.— In Perak, Selangor, Negri Sembilan and Pahang, there are a number of English schools maintained or assisted by the government, with an average enrolment of 5,000 boys and 1,400 girls, and 367 Malay vernacular schools, with an average enrolment of 19,286 and an average attendance of over 15,000. There are several Chinese schools, but they are not under the control or supervision of the Education Department. Expenditure on education in 1915 amounted to $260,000.

Government, Administration, etc.— The laws in force in each state of the federation are contained in enactments passed by the state councils, up to December 1909, and from that date, where more than one state is affected, by the Federal Council, which consists of the High Commissioner as President, the chief secretary, the sultans of Perak, Selango and Pahang, the Yam Tuan of Negri Sembilan, the four British residents, the legal adviser, and four unofficial members, and in addition to legislation deals with the annual estimates of revenue and expenditure. All legislative enactments are submitted to the High Commissioner and the Secretary of State for the colonies. There is a Supreme Court, comprising a Court of Appeals, magistrates' courts of the first and second class, and courts of a Kathi and assistant Kathi.

In Perak, Selangor and Sungei Ujong, British residents were appointed in 1874, with a staff of European officers whose duty was to aid the native rulers by advice, and to exercise executive functions. The supreme authority in each state is vested in the state council, consisting of the Sultan, the resident, the secretary of the resident, and some of the principal Malay chiefs and Chinese merchants. The residents are under the control of the Chief Secretary and High Commissioner.

In 1883 the relations of the Straits Settlements with the small native states on the frontier of Malacca were consolidated. These states were confederated in 1889, under the name of Negri Sembilan ("nine states"). In January 1895, Sungei Ujong, including Jelebu, and Negri Sembilan were placed under one resident and in the following July a treaty was signed by which the administrations were amalgamated. The new federation, which still retains the old name of Negri Sembilan, comprises the states of Sungei Ujong, Sri Menanti, Johol Jelebu, Rembau and Tampin. In 1887, by agreement with the Rajah of Pahang, the control of his foreign relations, etc., was surrendered to the British government. This was followed by a further agreement in 1888 with the Rajah, now styled Sultan, under which Pahang was taken under British protection, on the same terms as the Protected Native States on the west coast of the peninsula. In July 1896, the treaty between the four protected native states, Perak, Selangor, Pahang and Negri Sembilan, and the British government came into force by which the administrative federation of these states under a chief secretary is provided for, and the states agree to furnish a contingent of troops for service in the colony should the British government be at war with any foreign nation.

Military Forces, Police, etc.— The military force of the states consists of an infantry battalion of Sikhs and Pathans known as the Malay States Guides, to which is attached a mountain battery with mules. The rank and file of the police force consists of an Indian and a Malay contingent. The authorized strength of the force in 1915 was 97 European and five native officers, and 3,347 rank and file, but the actual strength was about 200 below this. There is also a detective branch consisting of Chinese, Tamils, Malays, etc., in charge of Europeans.

Population.— According to the last census Perak had a population of 494,057, of whom 344,238 were males and 149,819 were females; Selangor, 294,035, of whom 220,939 were males and 73,096 females; Negri Sembilan, 130,199, of whom 87,651 were males and 42,548 females; Pahang, 118,708, comprising 72,234 males and 46,474 females; a total of 1,036,999, of whom 725,062 were males and 311,937 females. The population contained 420,840 Malays, 433,244 Chinese, 172,465 natives of India, 3,284 Europeans and Americans and 2,649 Eurasians. The preponderance of males over females is due to the number of Chinese immigrants. The largest town in the states is Kuala Tumpur, in Selangor, with 60,000 inhabitants.

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FEDERATION OF LABOR. See AMERICAN FEDERATION OF LABOR.

FEDERMANN, Nikolaus, nē'kō-lous fā'dĕr-măn, German explorer: b. Ulm, Swabia, 1501; d. about 1542. He was sent to Venezuela by the Welsers of Augsburg, becoming chief lieutenant of Alfinger, and making explorations into the interior of the country. He returned to Europe 1532, going back to Venezuela 1534, as the lieutenant of George of Speyer. He did not follow the latter on one of his expeditions, as ordered, but made an independent exploration with 200 men, spending some years in the valley of the Orinoco, and reaching New Grenada in 1539, where he met Gonzulo Kuesada, already in possession, and relinquished the region to him. Federmann returned again to Augsburg, but was discharged by the Welsers for misfeasance. His account of his first exploration was published in German, 'Indianische Historia,' 1557, and in French 1837.

FEDERN, fā'dĕrn, **Karl,** German author: b. Vienna, 1868. He was educated in his native city, and from 1891 to 1894 was engaged in the practice of law, after which he devoted himself entirely to literature. He lived successively in Vienna, Berlin, London and Rome. He wrote on Italian literature and also on French and American literature. He published German translations of Emerson's 'Essays' (1894); 'Representative Men' (1906); Walt Whitman's 'Leaves of Grass' (1904) and the works of Saint Evermond (1912). His original works include 'Essais zur amerikanischen Litteratur' (1899); 'Dante' (1900); 'Dante and his Time' (1902); 'Essais zur vergleichenden Litteraturgeschichte' (1904).

FEDI, fā'dē, **Pio,** Italian sculptor: b. Viterbo. 1815; d. 1892. At the Vienna Academy he studied engraving but afterward abandoned this art for sculpture, studying to this end at the Academy of Florence and also at Rome. His first piece, 'Christ Healing the Sick' was a success, and in 1846 Fedi received commissions from Leopold II of Tuscany for statues of Niccola Pisano and Andrea Cesalpino for the façade of the Uffizi Gallery. His other works include the mausoleum of the daughter of the Russian general Swov; monument to Nicolini in Santa Croce; 'Sacred Poetry' in the city museum of Verona and 'The Rape of Polyxena,' his greatest work. In 1866 it was placed with the Renaissance groups in the Loggìa dei Lanzi.

FEDOTOV, fā'dō-tŏf', **Paul Andreievich,** a Russian painter who was born at Moscow in 1815 and died in 1852, is with good reason looked upon as practically the founder of the Russian «purpose painting» school; but to the circumstances of his life, rather than to any vigorous creative impulse of his nature, he owed that distinction. In 'The Russian School of Painting' (New York 1916), A. Benois writes: «The son of a retired officer, Fedotov grew up in the half-provincial Moscow, in a typical middle-class family. Here he became familiar with the every-day life of the residents. Later on, in the military school and in the society of his comrades, he acquired a familiarity with military circles. Finally, when he came in contact with the artistic world, it was too late to go to an [art] school: he was already a fully found man with well-shaped ideas and a manner of his own of perceiving and rendering things.» At that time, «despite the ruthless tyranny of Nicholas's government, the air was astir with [intellectual, artistic, spiritual] revolt. The necessity was felt of being renewed, regenerated.» These moods — the «tendency,» it was called — first found expression in literature of great power: they were also seeking expression in painting, but no echo could be expected from the bureaucratic and half-courtly world represented by and in the Imperial Academy of Art. «Fedotov alone was nearly fit for such a task, but even he, a retired officer, pensioned by the Emperor, a modest, simple man, intelligent but childishly naïve, could hardly come up to the level of the literature. He limited himself to what Gogol did (in 'Dead Souls,' 'The Revisers,' etc.), 15 years earlier, that is, to a keen but not very caustic satire of the foibles and follies of his compatriots.» And this turned out to be the most effective form of attack. He made his first appearance before the public with such paintings as 'The Fop' satirizing bureaucratic ambitions, and that gay satire on the life of the merchant class, 'The Major's Courtship.' Following these came a series of pictures in which he ridiculed the first phase of the feministic movement, the petty gentry, etc.— all of this series being conceived in a light vein, their intention being purely satirical, not didactic. «A field apart is occupied by his last works, in which he seems to turn to a quieter, more poetic, and more artistic way of looking at things. Such are his 'Widow' and the 'Officer at the Village,' extraordinary in its poignant sadness.» In the midst of such activity he became insane, and thus was lost to art before his early death. But he had demonstrated brilliantly that for the correction of abuses slight weapons could be employed. When they fell from his hands, his successors at first employed the same, but brutally afterward caught up bludgeons. We see, therefore, that Fedotov, a poor army officer with an ardent enthusiasm — but no training — for art, exerted such influence in an untried field because he realized that commentators upon the vices and follies of society, especially official Russian society, could express themselves under the cloak of apparently superficial wit that the jester's cap and bells must be, for art as well as for literature, the disguise in which they could escape the vigilant censorship enforced under Nicholas I. While Benois regards him as a «brilliant painter» and asserts that «some of the still-life in his pictures is worthy of the old Dutchmen,» another recent critic says that «the titles of Fedotov's pictures and sketches speak for themselves,» and mentions 'The Morning after the Wedding,' 'The Pet-Dog is Ill,' 'His First Decoration,' and 'The Choice of a Bride.' Both are right: his works at times had the character of mere illustration, but that will not keep a painter from seeing and saying that some of it is «brilliantly» above mere illustration. Consult Mewmarch, R., 'The Russian Arts' (New York n.d.).

FEE, John G., American abolitionist: b. Bracken County, Ky., 9 Sept. 1816; d. Berea, Ky., 12 Jan. 1901. He entered the Lane Theological Seminary, Cincinnati, Ohio, in 1842, and soon afterward began to preach against slavery. As a result he was mobbed several times, but in 1853 went to Berea, Ky., where he succeeded in founding a church and establishing Berea

College (q.v.), an institution open alike to blacks and whites.

FEE, FIEF, or FEUDUM, is a legal term of feudal origin, signifying an inheritable estate in land, held by some superior, or lord; as distinguished from *allodium,* which is land held by absolute ownership. In the United States, however, where land is generally held in allodium, the private ownership is termed the *fee,* if subject to no paramount right except that of the State. In England the legal theory is that all the lands of the kingdom, except the royal domains, are held in fee, or by a tenure, of some superior lord, the absolute or allodial property being only in the sovereign, so that all the tenures are strictly feudal. This was a significant doctrine while the feudal system flourished in Europe; and the remnants of it are still blended, in a greater or less degree, in the land titles or rather as a theoretical doctrine, from which certain inferences are drawn, than a plain, direct, practical fact; for the property of a proprietor in land held in *fee simple,* in England, is as absolute, to all intents and purposes, as where the land titles are allodial, there being no practical or theoretical doctrine of a tenure, or holding under a superior. *Fee tail* is any fee granted upon condition; or a fee limited to any particular heir or class of heirs; a qualified fee as differing from fee simple.

FEE SIMPLE, an inherited estate belonging to the owner, his heirs and assigns forever. This is the most complete and exclusive interest that the possessor of lands can have in them, and the word continued to be employed in real estate law after the feudal system had passed away. This is the case even in the United States, where land is generally held in allodium (q.v.) and subject to no paramount claim excepting that of the eminent domain which belongs to the State.

FEE SYSTEM, a term designating the compensation of certain officers or certain kinds of official service by fees rather than by salaries. The fees of an office in many instances amount to so large a sum as to make it an object of intense competition and of years of plotting. Before it was put on a salary basis the fees attached to the office of consul-general in London were said to amount to $100,000 a year. In a populous county, the office of sheriff ranges in some cases from $25,000 to $125,000 annually. To secure the election or appointment liberal contributions to party funds, political deals of any description, and even open corruption have been resorted to. The abolition of the fee system has long been advocated and in many sections of the United States has been abolished and the salary basis substituted. See Salary Grab.

FEE TAIL, an estate limited to a certain line of descent, to certain heirs or to a certain class of heirs; sometimes known as a conditional fee.

FEEBLE-MINDED, The. Definitions.— No strictly scientific definition of feeble-mindedness is possible in the present stage of our knowledge. The condition is fairly well indicated, however, by Tredgold (‘Mental Deficiency’) in the following language: «A state of mental defect from birth, or from an early age due to incomplete cerebral development, in consequence of which the person affected is unable to perform his duty as a member of society in the position of life to which he is born.»

Classification.— The feeble-minded are classified according to mental age, that is, the age of a normal child of the same mentality. For example, a feeble-minded person of mental age 6 has a mind approximately like that of a normal child of 6. The feeble-minded are also divided into three groups, idiots, imbeciles and morons. Idiots are those of mental age 1 and 2. Imbeciles comprise those of mental age 3 to 7 inclusive. Morons include those of mental age 8 to, perhaps, 12 — the upper limit is somewhat uncertain. It is also customary to speak of the I.Q. (Intelligence Quotient) of a feeble-minded person. This is found by dividing his mental age by his actual age, e.g., a child who is 12 years old and of mentality 9 would have an I.Q. of 9/12 or 75. In using the I.Q. no higher actual age than 16 is used because it is supposed that the mental age of the average man does not go beyond 16. So that if a feeble-minded person is, say, 30 years old, we divide by 16 and not by 30. (For further discussion of I.Q., consult Terman, L. M., ‘The Measurement of Intelligence’).

The different groups are rather significantly, though somewhat inaccurately, indicated by the expressions that the idiot cannot speak, the imbecile cannot read, the moron cannot cipher. There are certain exceptions to this since some who are classed as idiots do talk a little and rarely a person who is classed as an imbecile learns to read, while the moron may learn to add, subtract and multiply, less often to use long division and practically never to solve arithmetical problems.

The idiot is the helpless creature that is more or less familiar, almost entirely lacking in intelligence, frequently unable to feed himself, generally unable to control his secretions, and almost entirely incapable of being trained.

The imbecile is the silly, foolish child, commonly recognized as such. He is incapable of learning the ordinary school work, but is more or less trainable for simple tasks, such as single errands and certain kinds of crude and coarse heavy work.

The moron, on the other hand, is usually unrecognized by the layman, at least until he is almost an adult and even then is thought of as being merely peculiar or is characterized by some such expression as «not quite all there,» «eccentric,» «ignorant.» The moron is not profitably trainable in the ordinary school subjects, reading, writing and number work, even though a certain small percentage of them can learn something of these subjects as the result of great effort on the part of the teacher. They are, however, quite trainable in industrial and occupational work, anything of routine character not requiring judgment. They are almost never self-directing but require more or less constant oversight.

Disregarding the mentality or mental level, as it is called, the feeble-minded are sometimes classified on the basis of the causes of the condition or of certain accompaniments or peculiarities either physical or mental. (Consult Ireland, W. W., ‘Mental Affections of Children›). For example, the hydrocephalic, or large headed, is one who suffers from hydrocephalus. This may be an accompaniment to feeble-mindedness or possibly a cause.

The microcephalic is the small headed feeble-minded person. The brain has ceased to grow in bulk and the skull has closed over it, giving a very small head of characteristic shape.

The cretin is a feeble-minded person whose condition results from the absence of or hypertrophy of the thyroid gland, the consequence of which is an arrest of development both physical and mental. The cretin is of small stature and of low mentality. If, however, the condition is discovered in infancy, the child may be fed the thyroid gland of sheep or other animal and develop almost if not quite normally.

The Mongolian type is so called because of its more or less marked resemblance to the Asiatic races, the slanting eyes and general appearance of the face. In addition to this the condition is characterized by short, stubby fingers, absence of the occipital protrusion, showing a straight line from the neck up, and frequently, although not always, a deeply furrowed tongue. They generally have very poor circulation and suffer more or less from affections of the eye. They are exceptionally affectionate. The cause of the condition is not known, but it is something that acts *in utero* and probably affects the nutrition of the mother. For other types and other details the reader is referred to the works by Tredgold, Barr, Shuttleworth and Potts (see *Bibliography*).

History.— The present movement for the care of the feeble-minded was begun in 1837 when Dr. Seguin, called the apostle of the idiot, began his work in Paris. Some sporadic attempts had been made before this but they were of short duration and amounted to but little. In 1811 Napoleon ordered a census which showed over 3,000 cretins in one canton in Switzerland. In 1816 a school was founded for cretins at Saltzburg, Austria. A few idiots were trained at the asylum for the deaf and dumb at Hartford, Conn., about the year 1820.

The first institution for idiots was established in Germany in 1835. In 1841 another institution for cretins was founded by Dr. Guggenbuhl on the Abendberg, near Interlaken in Switzerland. This institution lasted 20 years.

In 1848, Dr. Samuel G. Howe started a class for the training of idiots at the Blind Asylum in South Boston, Mass. This led to the founding of the Massachusetts school, in 1851, for the care and training of the feeble-minded. New York established a similar school at Syracuse, N. Y., at about the same time. From that beginning the work has grown in the United States until at present there are one or more State institutions for the feeble-minded in 34 States.

These institutions are caring for approximately 35,000 feeble-minded and epileptic persons, constituting about one-tenth of the estimated number of feeble-minded in the United States. (For further details consult Fernald, W. E., ‹The Growth of Provision for the Feeble-minded in the United States›).

Causes.— In the Vineland study of 300 families Goddard found 66 per cent of feeble-mindedness hereditary, that is, the cause is defective germ plasm, which is transmitted probably in accordance with the Mendelian law of heredity. Of the remainder about 12 per cent appear to be due to what is called neuropathic ancestry. That is to say, the families are characterized by the presence of neuropathic conditions such as paralysis, hemiplegias, insanity, alcoholism and the like. Nineteen per cent are classified as being due to «accidental» causes including certain diseases. Of the latter, cerebrospinal meningitis is the most important, although typhoid fever, measles and even whooping cough are supposed by some to cause the condition, though this is doubtful. In 2.6 per cent of the cases no cause could be found. Alcoholism and syphilis are popularly supposed to be potent causes of this condition, but the evidence is inconclusive, since such cases often show also a family taint of feeble-mindedness, or neuropathic or other conditions that may equally well be causes. The further fact that there are large numbers of alcoholic and syphilitic families who do not have feeble-minded children throws doubt upon the probability of these conditions being causes.

Diagnosis.— The condition is now usually diagnosed by the aid of mental tests. A system of mental tests called «A Measuring Scale for Intelligence» was first devised by Drs. Alfred Binet and Th. Simon of Paris. This has since become widely used, has been revised and extended and is the stimulus and guide for many other systems of tests.

Scientific Study.— The first systematic scientific study of the condition and the causes of feeble-mindedness seems to have been made under the direction of Dr. Arthur C. Rogers at Faribault, Minn. Dr. Rogers opened a laboratory in 1898 and employed Dr. A. R. T. Wylie as psychologist. This work was discontinued in 1902. Superintendent E. R. Johnstone organized a laboratory at the training school for the feeble-minded at Vineland, N. J., 15 Sept. 1906. This work has continued and grown until the laboratory now occupies an entire building with a number of workers. There are also laboratories at Faribault, Minn., Waverley, Mass., Lincoln, Ill., and Eldridge, Cal.

Treatment.— As to treatment in the sense of a therapeutic measure or procedure for ameliorating the condition, there is none. Feeble-mindedness is not a disease. To be feeble-minded simply means that the mind for some reason has not developed to its full and complete maturity and under these conditions there is no drug or treatment known to science that can re-establish the growth when once it has permanently stopped. Much confusion in regard to this matter has existed in the past, largely because feeble-minded persons are subject to many if not all of the diseases that affect normal individuals. From this fact it was thought that the feeble-mindedness itself was caused by the disease and consequently any treatment that might improve this disease was expected to improve the feeble-mindedness. Experience has abundantly proved the error of this view.

It follows from this that the only treatment of which we can speak is social. The feeble-minded person is socially incompetent, that is to say, is not able to take care of himself or live an independent life. He must always be cared

EXPLANATION.

Squares indicate males. Circles indicate females. N means normal mentally. F (white on black background) means feeble-minded. E means epileptic Sx. Sexual offender. A. Alcoholic (drunkard). I. Insanity. C. Criminality. d. inf. Died in infancy. T. Tubercular.

Clear square or circle means mental condition not determined. Small black circle signifies miscarriage. Horizontal line connecting a square and a circle means marriage or mating. Symbols pendant from same horizontal line are brothers and sisters. Vertical line (longer) connects parents and their children.

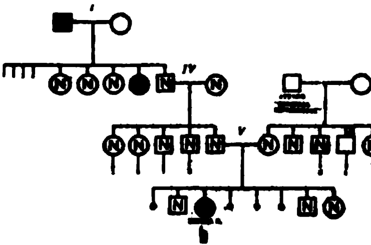
FIG. 1

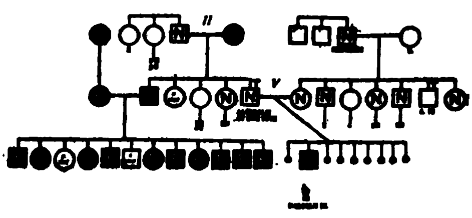
FIG. 2

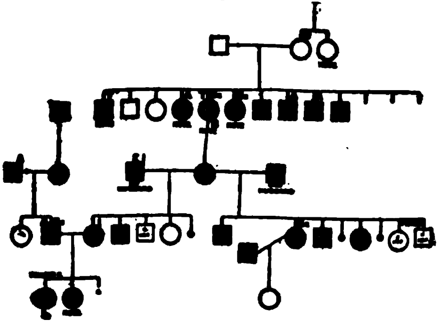
FIG. 3

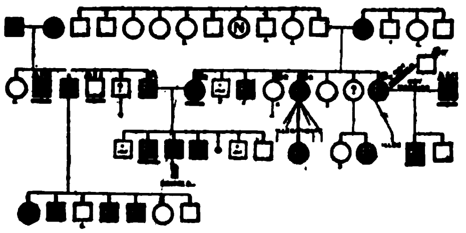
FIG. 4

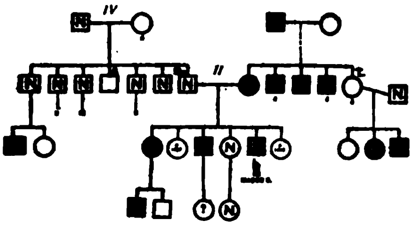
FIG. 5

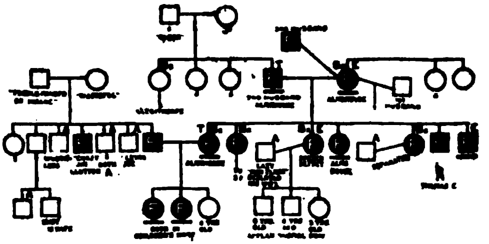
FIG. 6

TYPES OF HEREDITARY FEEBLE-MINDEDNESS.

Fig. 1. A mildly tainted family. Fig. 2. Two feeble-minded parents have only feeble-minded children. Fig. 3. A thoroughly defective family. Figs. 4 and 6. Almshouse type. Every symbol with heavy black line under it shows that the individual is in an almshouse or other institution at public expense. 5. Showing result of a normal man marrying a feeble minded woman.

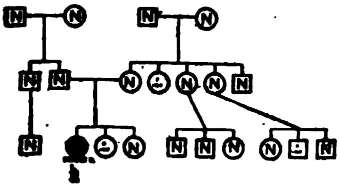
FIG. 1

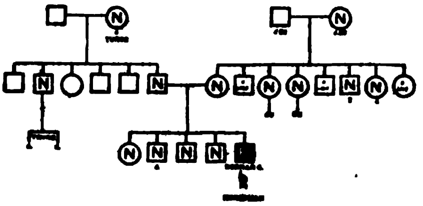
FIG. 2

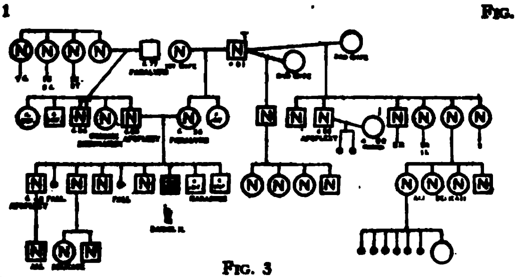
FIG. 3

TYPES OF NON-HEREDITARY FEEBLE-MINDEDNESS SHOWING THAT THERE IS NO OTHER FEEBLE-MINDEDNESS IN THE FAMILY.— Fig. 1. Girl feeble-minded from cerebro-spinal meningitis. Fig. 2. Feeble-minded boy of Mongolian type. Fig. 3. So-called neuropathic ancestry. Note the nervous instability of various members of the family.

for, just like a child. Indeed, he is a child in all but his physical form. At the present time the most prevalent view as to the treatment of the feeble-minded is that they should be segregated in institutions or colonies. The colony for the feeble-minded is nothing more than a group of such persons controlled by intelligent people in an environment as human and normal as possible, but where the conditions of life are simplified so that these persons of limited intelligence are able to live such a life as their limited mentality will permit; all of the complexities of modern civilization being removed or taken care of by those in charge.

Within the past decade a more intensive study of the problem of defective mentality has brought about the recognition of the fact that the number of such defectives is vastly greater than had ever been imagined and that large proportions of our criminals, paupers, prostitutes, drunkards, ne'er-do-wells, and even common laborers are mentally defective, in the sense that they have not the mind, the judgment, the will power to enable them to rise higher than they do in the social scale or to manage their own affairs with ordinary prudence. In view of this fact, the question of colonization becomes a very serious one. From the standpoint of practicability it is realized by the students of the problem that it is impossible to colonize all of these people, partly because we cannot provide the means necessary for their support; and largely because many of them still have enough intelligence to wish to be free and independent and do not take kindly to a life in which their affairs are largely managed for them. The consequence of this is, as stated above, that nine-tenths of the estimated number of mental defectives are not colonized. They are at large. Those of school age are in the public schools,— except the very low grade imbeciles and the idiots. This fact is being recognized and our more progressive cities are providing special classes for the care and training of these dull pupils. The argument for this is two-fold; first, and perhaps most important, that the normal children are vastly better off and more easily cared for and instructed when the defectives are removed from their classes. The second, and the more often realized and appreciated reason, is that the defectives themselves require an entirely different kind of education from the normal child. It is now known that they cannot master abstractions and consequently cannot learn, to any satisfactory degree, the usual subjects of the public school. They can be trained, however, to use their hands and to do such manual and industrial work as requires but little judgment. The policy at present then is to colonize as many cases as can be provided for or as can be induced to go to the colonies and to care for the rest in special classes in the public schools. The objection to the public school care of these children is that, the condition being so strongly hereditary, the children who do not go to the institutions or to colonies are left free to marry as they grow up and thus propagate another race of mental defectives. The second difficulty is that these defectives very easily become criminal or anti-social beings when not properly handled. They are easily influenced by vicious people, or even of their own accord are apt to get into trouble because all of the lower instincts which in normal persons are regulated and controlled by their judgment and reason, their training and experience, are in these cases uncontrolled and consequently lead them into criminality or other anti-social acts. For example, the feeble-minded boy will steal, because this is a natural, childish impulse, and he does not learn the abstract principle that stealing is wrong. The feeble-minded young woman will become a sex offender because yielding to the sex impulse is a natural instinct and she cannot learn the abstract principle that out of wedlock this is sin.

The saving fact in the situation is that in many of the feeble-minded these instincts are comparatively mild; and, if the condition is early recognized in childhood and the individual carefully trained and kept away from the knowledge of vice and very carefully guarded and controlled during life, they may be kept relatively innocent; and if wisely trained may be more or less useful. This, of course, does not apply to the lowest grade that have so little mentality that they must have perpetual care.

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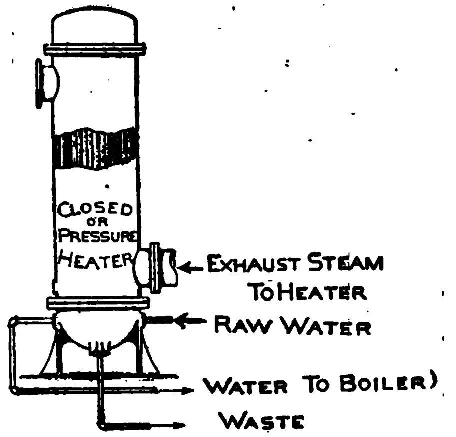
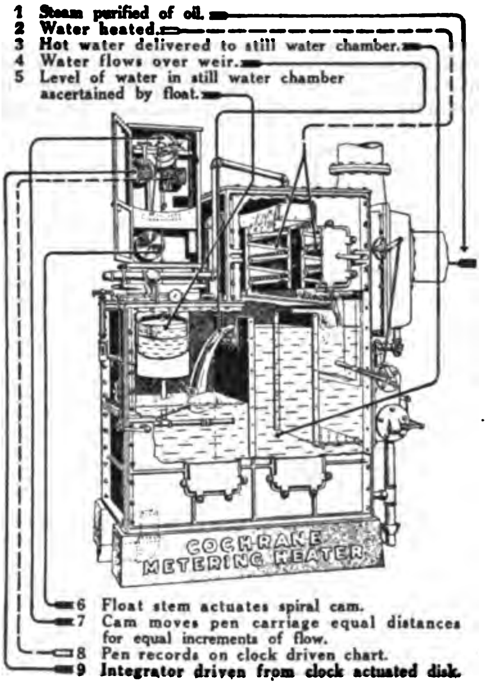
FEED PUMP, a force-pump, for supplying the boiler with water.

FEED-WATER HEATERS are employed to pre-heat the feed water supplied to steam boilers, in order to save fuel, increase the steaming capacity of the boiler, protect the boiler against temperature strains and to eliminate scale-forming and corrosive impurities. For each 11° F. that the temperature of the water is raised, about 1 per cent less fuel will be required or if the same amount of fuel be burned, the steaming capacity will be increased about 1 per cent. Pre-heating of the water prevents chilling of plates, tubes and other metal parts of the boiler and thus avoids injurious contraction strains about riveted joints, tube ends, etc. Certain scale-forming impurities in natural water supplies are precipitated to some extent by heating of the water and for that reason are known as "temporary hardness" in distinction from substances which are not affected by ordinary pre-heating, known as permanent hardness. The precipitation of calcium carbonate by heat is a phenomenon familiar to most users of water from the ordinary kitchen-range heater. Nearly all water supplies also have in solution oxygen from the air and other gases, which have a corrosive effect upon iron pipes and boilers. Inasmuch as the solubility of these gases is reduced to zero in water heated to atmospheric boiling point, they may be driven off by heating in the open type of heater described below. There are three classes of feed water heaters in general use: so-called closed or tubular heaters, in which the boiler feed water is passed through metal pipes surrounded by steam, usually steam exhausted from pumps, engines or other steam using appliances; open heaters, in which the water is sprayed over trays in contact with the steam in an open chamber or box; and fuel economizers, in which the water is pumped through cast iron or other pipes, over which are passed the flue gases on the way from the boilers to the chimney. The advantage of the closed heater is that inasmuch as the water does not come into actual contact with the steam there is no danger of the water becoming contaminated by the cylinder oil which is present in the steam exhausted by reciprocating engines and pumps. Its disadvantages are that the heat must be transmitted through a metal wall and that the water cannot therefore be raised to the full temperature of the steam. A temperature of 160° to 180° F. is ordinarily all that is obtained with closed heaters. The exhaust steam in giving up its heat to the water is condensed and, unless an oil separator is used in the steam line, contains grease and oil and must be thrown away, although except for the oil, it is pure distilled water. The closed heater receives cold water at temperatures varying from 32° to 100° F., and delivers water at much higher temperatures. It is therefore apt to be subjected to severe temperature strains, causing loosening of the joints and leakage. The heating of the water also causes the deposit of scale-forming matter upon one side of the heating surface, while oil and grease may be deposited upon the other, both interfering with the transfer of heat and requiring frequent cleaning. In open heaters, the danger of contamination from cylinder oil has been averted by the use of oil separators attached to and forming a part of the heater; and because of the higher temperature which such heaters give, also the fact that the exhaust steam condensed in heating the water becomes a part of the boiler feed supply, thus saving the heating of an equal amount of raw cold water, also due to the fact that the water is purified by the driving off of air and gases, the open heater has become practically standard in the United States. The open heater is ordinarily provided with attachments performing functions additional to that of heating the water. It is ordinarily used as a hot well or receiver for water discharged from steam traps, water condensed in heating coils, jackets, etc., and for the condensate from the condenser, by means of which a vacuum is maintained on the engine or turbine exhaust. The additional amount of water, ordinarily known as make-up water, which may be required for the boiler feed pumps, is admitted through a valve controlled by a float in the water storage space of the heater, which thus takes the place of an automatic make-up water regulator. Where more exhaust steam is available than can be used for heating the boiler feed water, the surplus is often applied to heating buildings or to industrial operations and for such use should be purified of oil, so that the condensate may be brought back to the heater and used for boiler feeding. In such cases the oil separator attached to the heater is made large enough to purify all of the exhaust steam, the surplus not required in the heater passing through a steam-stack attached to the separator, directly to the heating system or other apparatus. Where the raw water supply used for boiler feeding contains troublesome amounts of scale-forming and corrosive substances, such as sulphates of lime and magnesia, which are not precipitated by heat, provision is made for feeding a suitable amount of some transforming reagents, such as hydrate of lime and sodium carbonate, in which case the heater is known as a hot process softener, or softener heater. The reagents employed may be the same as those used in the ordinary cold process softener, but the action of heat is greatly to accelerate the chemical transformations and to form coarser and larger precipitates, which settle out more quickly in the settling chamber. The latter is made larger than in the ordinary open heater, but requires to be only one-sixth to one-third as large as would be necessary with a cold process softener. The reaction in hot water is also more complete and less reagent is required to give a given degree of removal of the scale-forming substances. The effect of heat in accelerating chemical reactions is a familiar phenomenon, as for example the action of soap upon grease and dirt in the washing of clothes and dishes. Recently a new form of feed water heater has been widely introduced, in which the water is passed over a weir having the form of a V-notch, in order to measure it before it is pumped to the boilers. An automatic clock-driven mechanism constantly records the height of the water on the up-stream side of the weir, thus preserving an accurate record of the amount passed. By comparing the amount of water evaporated by the boiler with the amount of fuel used, a measure is obtained of the efficiency of the boiler and improvements in effi-



ciency, as by the use of different grades of coal; improved methods of managing the fires, repairing of leaks in the boiler setting, cleaning of scale and soot off the heating surface of the boiler, etc., are readily recognized. The record supplied by the meter thus becomes a tell-tale of the efficiency of the plant and of its operation. Heaters having this attachment or modification are known as metering heaters. Fuel economizers, in which the water is heated by the exhaust gases, have the advantages that they utilize waste heat not otherwise applicable, except possibly for pre-heating the air supplied to the boiler furnace and that they are able to raise the temperature considerably above atmospheric boiling point, as to 250° to 350° F. The disadvantages are that a large amount of costly heating surface is required and that it must be kept free of soot on the outside and of scale on the inside. Nevertheless recent practice has favored the use of less boiler heating surface, hence the discharge of the gases from the boiler at higher temperatures, the heat being recovered more advantageously by the economizer, since the latter contains water at a temperature lower than that of the water in the boiler. The economizer should in no case receive water at a temperature lower than about 120° F., as otherwise sweating and rapid external corrosion of the tubes will occur. The water may advantageously be pre-heated in an exhaust steam feed water heater, receiving exhaust steam from steam plant auxiliaries such as boiler feed pumps, stoker and fan engines, condenser, circulating and air pumps, etc. So long as all of the exhaust steam from the latter is condensed in the feed-water heater, the fuel cost of their operation is practically nil, all of the heat in the exhaust steam being returned to the boiler.

George H. Gibson.


1 Steam purified of oil.
2 Water heated.
3 Hot water delivered to still water chamber.
4 Water flows over weir.
5 Level of water in still water chamber ascertained by float.
COCHRANE METERING HEATER
6 Float stem actuates spiral cam.
7 Cam moves pen carriage equal distances for equal increments of flow.
8 Pen records on clock driven chart.
9 Integrator driven from clock actuated disk.

FEEDER, (1) a stream, fountain or channel which feeds or supplies a main stream or canal with water. (2) A branch or side railway, intended to bring traffic to the main line. (3) In hydraulic engineering, a feeder is a watercourse, natural or artificial, carrying water to a canal or reservoir. (4) In mining, the side branch of a vein which passes into a lode. (5) In sewing machines, that part which carries the cloth along the length of a stitch between each penetration of the needle. (6) In machinery, an auxiliary or supplying part of a machine, that which leads along the stuff being operated on. (7) In iron founding, a head or supply of fluid iron to a runner or mold in heavy castings. (8) In nail making, a contrivance with an intermittent oscillating or semi-rotary and forward motion to present the plate to the cutters, so that the head of the nail may be taken from the respective edges alternately. (9) In printing, a device with fingers which take the top sheet from a pile and lead it into the press where it is printed or folded. (10) In steam engineering, a device for supplying steam boilers with water in quantities as required. Automatic boiler-feeders act by means of floats on the surface of the water in the boilers. (11) In threshing, the grain-feeder, which forwards the opened sheaves into the throat of the thresher, or the grain into the eye of the millstone, or the grain and chaff from the hopper to the riddle of a winnowing machine, or the grain from the bin to the manger of sheep or other stock. (12) In electricity, a lead in an electric central station distribution system, which lead runs from the station to some point in the district to supply current.

FEEDING, Forced, a mode of putting food into the body of persons who are incapable of feeding themselves, or who refuse, through insanity or some other cause, to take food. In many protracted diseases, such as typhoid and pneumonia; in certain stages of tuberculosis; in cancer of the stomach; in ulcer of the stomach, and in other conditions, it may be impossible for the patient to hold food in the stomach. The patients may be fed either through the stomach-pump or by means of rectal enemata, the former being the method to be preferred. In this the physician passes a soft rubber tube through the nose into the œsophagus and stomach, care being taken that the tube does not pass into the larynx. Through the tube, then, either by means of a Davidson syringe or through a funnel, the food, usually milk, is passed. Insane people rarely attempt to vomit their food after it has been once passed in this way, although many refuse to take it and swallow it in the ordinary manner. The object of forced feeding is to introduce into the stomach sufficient liquid and semi-liquid food to sustain life. The most frequently used form of nourishment in forced feeding is a combination of eggs and milk beaten up. Milk is often combined with somatose, cream, plasmon or beef juice. Sugar and salt are also added frequently to the mixture. Patients often gain in flesh under forced feeding, which is frequently a necessary prelude to the treatment of certain forms of insanity. Subcutaneous atimentation is sometimes made to serve the purpose of forced feeding.

FEEDING LIVE STOCK. See Live Stock, Feeding of.

FEEDING MACHINE. By this name are commonly known the machines used to automatically supply printing-presses or the like with paper sheets. Printing of a high grade is not done on the great web printing machines, which feed from a roll of paper. Those are built for speed, but for fine printing presses of the single cylinder type, using single sheets of paper are almost universally used. Such presses were always fed by hand until about 1895, when the first practical paper-feeding machines for printing-presses began to come into use. The first of these machines to secure a considerable sale was the Economic feeder. A little later the Dexter pile feeder came in the market. This machine is attached at the rear of a cylinder printing machine, and lifts a sheet of paper from the top of a pile by first buckling the two rear corners, then blowing air under the buckled sheet to separate it wholly from the rest of the pile, after which the sheet is advanced or pushed forward to the guides of the press by means of rubbers and traveling endless tapes. The pile of paper from which the sheets are fed is placed on a platform that is arranged with mechanism for raising it very slowly, so that the top of the pile is always kept at substantially the same level. The perfecting of these machines has been obtained only after very costly experimenting, and the addition of improvements as defects were found. Paper piled in sheets has a tendency to stick together, in fact, sheets are sometimes actually glued in spots, as by the crushing of an insect between them. The automatic feeding machine has to provide for such contingencies, and when a torn sheet is found, or a wrinkled one, or two sheets stuck together, the feeder must not only be stopped, but the printing-press also must be brought quickly to a standstill or damage results. Ingenious automatic devices have been introduced for controlling these conditions, and the machines are now commonly used in connection with the printing of magazines of large circulation, some of the larger magazine and book printers employing as many as 30 or more feeding machines in one establishment. The Dexter machines will accommodate 10,000 to 20,000 sheets of paper at a single loading, which saves the time formerly lost by the hand feeder about once in 1,000 sheets, in stopping to put up another pile. There is also a saving in soiled sheets, in wages paid, and often in the speed at which the printing-press can be run. A few years ago the Dexter Company brought out the reloading feeder, which has an auxiliary table or piling board, permitting the reloading of the machine with a very trifling stop. Dexter was the first to introduce a machine driven by floor connections, which secures greater rigidity than when driven by a chain from the cylinder of the press. Non-electrical devices are employed throughout, some of the most ingenious being the devices for calipering the sheet, to make sure that two sheets do not go into the press together, and the controlling apparatus for tripping the impression of the printing cylinder if a sheet is missed or fails to come down properly to the guides. The Dexter Company also builds folding machines, and their feeders are adapted to use with these, as well as for ruling machines.

The Cross continuous paper-feeder, made also by the Dexter Company, does not occupy any floor space, as do those previously described, being located above the feed-board of the press. It accommodates several hundred sheets at a time and reloading is accomplished without stopping the press. It requires no adjustments for quality or weight of paper, and is practical for short as well as long runs. The sheets of the pile are combed out, then turned completely over and reversed in direction and guided one by one to the feed-guides of the press. The Harris printing-press, a job rotary machine, built in a great variety of styles, employs a feeding mechanism that should be mentioned in this connection. It automatically picks an envelope or card from the bottom of a pile and carries it into the press. It will also feed very light and thin papers with accuracy. All the modern automatic job presses now employ feeding mechanism as a part of their equipment. See PRINTING; FOLDING MACHINES.

FEEHAN, Patrick Augustine, American Roman Catholic prelate: b. Tipperary, Ireland, 29 Aug. 1829; d. Chicago, Ill., 12 July 1902. He was graduated from Maynooth College, Ireland; came to the United States in 1852, when he was ordained, and soon after became president of the Seminary of Carondelet. He had charge of Saint John's Church, Saint Michael's and the church of the Immaculate Conception, all in Saint Louis, till 1865, when he became bishop of Nashville, and was installed as first archbishop of Chicago in 1880. During his earlier career he showed great devotion and self-sacrifice in several yellow fever and cholera visitations, and in his administration as archbishop he founded several new parishes, a college of the Christian Brothers and established several religious orders in the archdiocese.

FEEJEE ISLANDS. See FIJI ISLANDS.

FEELING, the sense of touch, emotion. See EMOTION; PSYCHOLOGY.

FEER-HERZOG, Karl, kärl fār-hĕr'tsoн, Swiss statesman: b. Rixheim, Alsace, 2 Oct. 1820; d. Aarau, 16 Jan. 1880. He became a member of the Grand Council 1852 and was twice its president. In 1865 he was made Swiss representative in the Latin Monetary Union, which position he held for the rest of his life. He was director of the Swiss department of the Paris Exposition 1867, and for many years was president of the Swiss Financial Commission. Among his works are 'L'Unification monétaire internationale' (1869); 'La France et ses allies monétaires' (1870); 'Gold oder Silber?' the latter in German (1874).

FEET WASHING, or WASHING OF FEET, a religious ceremony observed in the Roman Catholic Church on Holy Thursday or the Thursday before Good Friday. This ceremony takes place just after everything has been removed from the altar. The pastor or principal prelate of the church washes the feet of 12 men, in imitation of the action of Jesus Christ, when he washed the feet of his apostles. The Pope washes the feet of 13 priests. The ceremony is sometimes called «Mandatum,» from the first word of the antiphon sung during the ceremony: «Mandatum novum,» etc.; «A new commandment I give unto you that you love one another.» This custom, although mentioned in the Council of Toledo (694), is not now generally recognized.

FEHLING, Hermann, hĕr'män fā'ling, German chemist: b. Lübeck, Germany, 9 June 1812; d. 2 July 1885. He studied chemistry in Heidelberg, at Giessen in Liebig's laboratory and at Paris. He became professor of chemistry in the Polytechnic School at Stuttgart and professor emeritus in 1882. He had great authority in the educational and manufacturing circles of his time as a teacher and prescriber of chemical formulæ for commercial products, such as sugar and mineral waters. The so-called Fehling's Solution (q.v.) is famous. He wrote 'Text-book of Organic Chemistry'; translated Payen's 'Précis de chimie industrielle,' and edited a new edition of 'Glossary of Chemical Terms.'

FEHLING'S SOLUTION, a solution much used by chemists for the detection and estimation of glucose and certain other sugars. In its preparation 34.64 grams of pure sulphate of copper crystals are dissolved in 200 grams of distilled water, and (separately) 173 grams of crystallized neutral tartrate of sodium are also dissolved in 500 or 600 grams of a solution of caustic soda having a specific gravity of 1.12. The copper solution is then gradually added to the caustic soda solution, and the mixed liquid is diluted to one litre. Fehling's solution must be freshly prepared, for, like all other copper-test solutions it becomes unreliable in a short time, thereafter indicating sugar where none exists. For use a small quantity of the solution is placed in a test tube and diluted with about four times its bulk of water. It is then boiled for a few seconds, and if it remains clear it may be considered to be in good condition. The fluid to be tested is then immediately added, drop by drop, until a bulk equal to that of the diluted test fluid has been added. If glucose is present a yellow precipitate of hydrated cuprous oxide is thrown down, which subsequently loses its water of hydration and beomes reduced to ordinary red cuprous oxide. When prepared as described above, one cubic centimeter of the standard (undiluted) solution corresponds to five milligrams of glucose. Fehling's solution is of a deep blue color, and in testing a complicated organic fluid (such as urine) for glucose it often happens that the test solution is decolorized even when no glucose is present. It is, therefore, important to observe whether or not an actual precipitate is formed, as mere decolorization is not a sufficient indication. Cane-sugar does not reduce Fehling's solution in the cold, but it does so when warmed, because heat changes cane-sugar to a mixture of glucose and fructose in the presence of the alkali that the test solution contains. Maltose (malt sugar) and lactose (milk sugar) reduce Fehling's solution. The solution is named from Hermann Fehling, who first introduced it into analytical practice. See Pavy's Solution; Urinary Analysis; Carbohydrates.

FEHMARN. See Femern.

FEHMGERICHTE. See Vehmgerichte.

FEHMIC (fā'mĭk) **COURTS,** certain tribunals, which in the Middle Ages wielded tremendous power in Westphalia and other parts of Germany. Their institution has been traced back to the time of Charlemagne. They were known as free courts from the fact that all free-born men were eligible for membership. Their jurisdiction was derived from the emperor, who gave them the power of life and death (*blutbann*) which they exercised in his name. At times secret sessions were held to which only the initiated were admitted, all others being excluded under pain of death. The organization of the courts spread rapidly about the beginning of the 13th century. The *Freischoffen,* who constituted the great body of the initiated, were sworn to uphold the Fehme with all their powers, to guard its secrets, and to bring before it anything within its competence that they might discover. They were initiated into the secret signs by which members recognized each other and were presented with a rope and knife marked with cabalistic letters. The president of the court was the *Freigraf,* who was appointed for life by the *Stuhlherr* who was chief of a centre of jurisdiction and whose superior was the *Oberstuhlherr* or supreme judge. After 1180 the supreme head was the archbishop of Cologne. The procedure of a session followed closely that of the ancient German courts. It was held by day in some well-known spot. The accusation could be made by a *Freischöffe* only and if the offense was punishable by death a summons was issued to the accused to whom 45 days of grace were allowed. The judgment was executed on the spot if that was at all possible. If the accused did not appear, the sentence was imparted to the whole body, and the individual who first encountered the condemned was bound to slay him, leaving a knife with the insignia of the Fehme on the body to show that the deed was not a murder. With many modifications the system survived in Westphalia down to 1811. Consult Tross, L., 'Sammlung merkwürdiger Urkunden für die Geschichte der Fehmgerichte' (Hanover 1826); Dahlmann-Waitz, 'Quellenkunde' (Leipzig 1906, 1907).

FEIA (fā'yą) **LAKE,** in the province of Rio de Janeiro, in Brazil, near the coast. Area, 192 square miles. Connections by canals have been made with the Parahyba River on the north and the Atlantic on the east.

FEIGNED DISEASE. See Hysteria.

FEIJO, or FEIJOO, Diogo Antonio, dē-o'go än-to'nē-ō fā zho', Brazilian statesman: b. São Paulo, Brazil, 1784; d. 1843. As a priest he did pastoral work for many years, and in 1822 was elected to the Cortes at Lisbon, Portugal. When Brazilian independence was won he returned to America; in 1826 was chosen by the Liberal party as their deputy and representative, and introduced measures for municipal reform and the abolition of clerical celibacy. He served as Minister of Justice 1831–32; was regent 1835–37, but in 1837 he retired from politics, before the storm of Conservative opposition which his liberal policy had called up and was later sent into exile.

FEIJÓO (fā-zhō) **Y MONTENEGRO, Benito Gerónimo,** Spanish monk and scholar: b. Santa María de Melias, 8 Oct. 1676; d. Oviedo, 26 Sept. 1764. In 1688 he entered the Benedictine order, and his devotion to study brought him to the forefront among the learned of his native land. He was appalled by the superstition and ignorance of his countrymen and exposed them in the *Teatro critico* from

1726 to 1739 and in the *Cartas eruditas* from 1742 to 1760. His revelations excited considerable opposition in certain quarters but it was futile and the genuine services of Feijóo to the cause of education and enlightenment were generally recognized and he has been long regarded as the pioneer of educational reform in Spain. See CARTAS OF FEIJÓO.

FEILDEN, fēld'ĕn, **Henry Wemyss**, English naturalist: b. 6 Oct. 1838. He was educated at Cheltenham College, served in the Indian Mutiny 1857–58 and in China in 1860. In the American Civil War he served in the army of the Confederate States with the rank of assistant adjutant-general, surrendering after the last battle of the war, with the remnant of the Army of Tennessee under Gen. J. E. Johnston to General Sherman. He served as naturalist to the British Polar Expedition of 1875–76 and took part in the wars with the Boers in 1881 and 1900–01. He visited Grinnell Land, Ellesmere Land, Greenland, Spitzbergen, Novaya Zemlya, Waigats, Lapland and northern Russia for scientific research. He was made Companion of the Bath in 1900.

FEINT, fānt, a strategic movement, designed to deceive the enemy and conceal the main design or purpose. See TACTICS, MILITARY.

FEIS CEOIL, fāsh'k-yōl' (Ir. *feis*, gathering, convention, *ceoil*, of music). In Ireland, an assembly at which competitions are held for bands, choirs, vocal and instrumental soloists, etc. The first assembly of the kind in modern times was held in Dublin in 1897 for the purpose of encouraging native performers and composers. Since that time many such assemblies are held in the provincial towns and even in rural districts. The movement has been most successful and is a result of the general Gaelicising program of the Gaelic League (q.v.).

FEISI, Abul Feis ibn Mubárak, ā'bool fā ēs ibn moo-bā'rāk fī'si or fā-ē-sē', Indo-Persian poet and scholar: b. Agra, India, 1547; d. there 1595. He surpassed all his contemporaries in philological, philosophical, historical and medical knowledge, and about 1572 was crowned «king of poesy» in the court of the Emperor Akbar. Of his poems the most noteworthy are his lyrics — odes, encomia, elegies and specially his four-line pieces or apothegms. Their exalted pantheism brought on him the enmity of the orthodox Moslem clergy. He wrote also many double-rhymed poems; and a Persian imitation of the famous Indian epic ‹Nala and Damajánti,› designed to form the third member of an epic cycle of which the first was to be ‹The Centre of the Circle,› the second ‹Solomon and Balkis› (the queen of Sheba), the fourth ‹The Seven Zones of the Earth,› and the fifth ‹The History of Akbar›; only the first and third were completed. His scientific treatises were numerous.

FEITH, fīt, **Rhijnvis**, Dutch poet: b. Zwoll, Over-Yessel, 7 Feb. 1753; d. there, 8 Feb. 1824. He was made burgomaster and afterward receiver at the admiralty college in Zwoll, but did not cease to cultivate the art of poetry and to enrich Dutch literature. He tried his powers in almost every department of poetry. In his earlier years he was too much inclined to the pensive and sentimental style. It predominates particularly in his romance ‹Ferdinand and Constantia› (1785), and, through his example, has for a long time prevailed in Holland. His ‹Grave› (Het Graf 1792) is the first distinguished didactic poem since the revival of Dutch poetry. His ‹Old Age› (De Ouderdom) appeared 1802. Among his lyric poems, ‹Oden en Gedichten› (1798), are several hymns and odes distinguished for great elevation and feeling. His ode on ‹Ruyter› is very celebrated. He also made that naval hero the subject of an epic poem. The best of his tragedies are ‹Thirza›; ‹Johanna Gray,› and particularly ‹Inès de Castro.› His poetical ‹Letters to Sophia on Kant's Philosophy› (1805) are a feeble effort of his old age. Among his prose works, his ‹Letters on Different Subjects of Literature› (1784), contributed much to the dissemination of good taste, by their finished style and excellent criticisms.

FÉJÉRVARY, fĕ'yār-vā'rĭ, **Géza**, BARON, Hungarian soldier and statesman: b. 1832; d. 25 April 1914. He entered the army at 19 and fought with distinction at the battle of San Martino in 1859. On the eve of Solferino he carried out a daring reconnaissance and gained information that might have won the day for Austria had it been properly used. When the Dual System was created in 1867 he was transferred to the Honvéd, or Hungarian defense army, of which, first as under-secretary and after as minister, he was the principal organizer. On the fall of the Tisza government in 1905 the opposition refused to take office unless Magyar words of command were introduced into the Hungarian regiments of the joint army, which the Emperor Francis Joseph sternly refused to grant. The emperor desired to place Féjérvary at the head of a fighting cabinet, an honor which the old soldier, who was only two years younger than the emperor, refused. His objections were overruled, however, and he became Premier. All attempts to negotiate with the coalition failing, he launched a campaign for universal suffrage for Hungary and advised the Crown to summon the five coalition leaders, Andrassy, Apponyi, Zichy, Bánffy and Kossuth to appear before the monarch in Vienna. In a five minutes' audience the emperor declared his standpoint and dismissed them with a severe admonition. In February 1906 Féjérvary dissolved the Chamber with a high hand and six weeks later the coalition leaders came to terms, waived their chief demand and took office. Baron Féjérvary now stepped aside and lived in comparative repose as captain of the Hungarian Guard. He was an inveterate gambler and the emperor paid his debts more than once. On the last occasion, Francis Joseph gave him a roll of banknotes to pay a gambling debt and demanded his word of honor that he would never play again. «But if the temptation is too strong,» he added, «here is the remedy,» and handed him a revolver.

FELANITX, fā'la-nēch, or **FELANICHE**, Spain, town on the island of Majorca, province of Baleares, located in a valley surrounded by steep hills. The noteworthy buildings are the church of San Miguel, the town hall and a Moorish castle. Stock raising and fishing are the principal industries and there is a brisk trade in these products and in wine. It has also manufactories of pottery, cloth, soap, lime and liquors. Felanitx is the ancient Canati. Pop. 11,223.

FELCH, Alpheus, American lawyer and politician: b. Limerick, York County, Me., 28 Sept. 1806; d. 1896. He was graduated at Bowdoin College 1827, was admitted to the bar and practised law in Michigan, being elected to the legislature of that State 1836 and appointed bank commissioner 1838–39. He was judge of the Supreme Court 1842–45; governor of Michigan 1846–47; and United States senator 1847–53; he was appointed professor of law in Michigan University in 1879, holding that position till 1883.

FELDER, Cajetan, Baron, Austrian politician: b. Vienna 1814; d. 1894. He was educated at the University of Vienna, where in 1841 he was appointed to the chairs of political history, statistics and international law. From 1868 to 1878 he was burgomaster of Vienna and in 1869 was elected to the upper house. From 1878 to 1884 he was marshal of Lower Austria. He published papers on entomology in ‹Reise der Fregatte Novara um die Erde› (1864–75), and wrote ‹Die Gemeindeverwaltung der Reichshaupt-und Residenzstadt Wien› (2d ed., 1872; 2 additional vols., 1875–78).

FELDKIRCH, fĕlt'kĭrh, Austria, town in the province of Vorarlberg, 20 miles south of Lake Constance, 1,500 feet above sea-level, on the Ill River. The town is of great military importance because it commands the entrance into the Tyrol from the west through the Arlberg Pass. The town is 24 miles southwest of Bregenz. The principal buildings are the parish church, a Capuchin convent and church, a Jesuit educational institution, known as the «Stella Matutina.» There are also cotton spinning and weaving establishments, bell founding and dyeworks. The town has witnessed many armed clashes, notably that of 1799 between the Austrians and the French, when the latter were driven back. The castle of Schattenberg nearby, the ancient seat of the counts of Montfort, is now used as an almshouse. Pop. 5,057.

FELDMANN, Leopold, lā'ō-pōlt feld'-män, German dramatist: b. Munich, Bavaria, 22 May 1802; d. Vienna, 26 March 1882. In 1835 appeared his ‹Lays of Hell›; next the comedy ‹The Son on His Travels,› which made a brilliant success at Munich. After five years in travel, chiefly in Greece, as correspondent of the *Allgemeine Zeitung,* in 1850 he settled in Vienna for life. His comedies were very popular in their day. Among them are ‹Free Choice›; ‹Sweetheart's Portrait›; ‹The Late Countess›; The Comptroller and His Daughter.›

FELDSPARS, the most important group of silicate minerals. They are characterized by monoclinic or closely related triclinic crystallization, the frequent occurrence of twin crystals, cleavage in two similar directions inclined at an angle of 90 degrees or nearly 90 degrees, a hardness of about 6, a specific gravity between 2.5 and 2.9, a light color, usually white, pale yellow or green, or flesh-pink, a white streak and a low relief and low order of interference colors as seen in thin sections with the polarizing microscope.

Uses.— The chief usefulness of the potash and potash-soda feldspars results from the fact that within certain limits of temperature they melt without becoming quite fluid and on cooling form a strong colorless or very light colored glass. Because of this quality, feldspar is extensively used in the manufacture of porcelain, serving as a flux to bind together the other constituents, clay and flint. It is also one of the principal ingredients in the glaze for chinaware and tiles. In almost all forms of pottery it is used both in the body and in the glaze; in the former in the proportion of 10 to 30 per cent, in the latter, 35 to 50 per cent. In the manufacture of corundum and emery wheels, feldspar is used as a binder. Small quantities of the purest grade are used in making artificial teeth. It is one of the essential ingredients of opalescent glass. In powdered form it supplies the abrasive in scouring soaps and window cleaners. In crushed form it becomes poultry grit and a surface for the «granitoid» varieties of ready roofing. Many attempts have been made to extract the potash from feldspar for fertilizing purposes, but without success from a commercial point of view. The beautiful play of colors in labradorite has led to its use for table tops and inlaid work. The gem moonstone is a variety of feldspar, usually oligoclase; the sunstone is averturine feldspar. The peculiar radiance of these gems is caused by oriented lamellar inclusions which reflect the light with great intensity.

Production.— The total amount of feldspar sold in the open market in the United States in 1916 was 118,465 long tons, valued at $404,689. There was, besides, a large production which was ground and consumed by the industrial concerns mining it and of which no report was made. The largest production was recorded for North Carolina — 30,955 tons. In Maine the total marketed was 25,000 tons; and in Maryland, 21,364 tons. The Maryland product brought much the highest price. About 82 per cent of the total output was used in the ceramic industries; about 7 per cent in the manufacture of roofing and for the facing of concrete; and about 3 per cent in the making of glass. The 8 per cent not accounted for is probably that used in experimenting in the endeavor to release the potash from its combination in feldspar, so as to render it available as a fertilizer in the agricultural industry.

Occurrence.— The feldspars are the most abundant mineral constituent of the majority of the igneous rocks and are abundant in many metamorphic rocks. They are also present in some sedimentary rocks. The limesoda feldspars are more abundant in the igneous rocks, and the potash feldspars in the metamorphic rocks. In the sedimentary rocks they occur as fragments, especially in the arkose sandstones and graywackes. They occur also in veins, where they were deposited from aqueous solutions. The great pegmatite veins or dikes are believed by some geologists to have been deposited in this way. Feldspars are known also to have been deposited from the gaseous exhalations from volcanic vents.

The feldspars now occupy a most important position from a scientific standpoint, since the present scheme of classification of igneous rocks is chiefly based on the identity of the contained feldspar (see Rocks). Orthoclase is an essential constitutent of granite, syenite and porphyry, while it is also one of the constituents of gneiss and the other granitoid rocks. Its variety sanidine is the feldspar of trachyte and phonolite. Microcline occurs similarly and is not easily distinguished from orthoclase except by an optical examination, though its two prominent varieties, amazonstone and chesterlite, are quite distinct. Albite is an essential constituent of diorite and is one of the component minerals of many crystalline rocks, occurring associated with orthoclase and microline in much granite and gneiss. Albitic granite is often the matrix of the rarer minerals, and especially of some of the gems. Oligoclase abounds in granite, syenite, gneiss, diorite, trachyte, andesite and diabase, often being associated with orthoclase. Labradorite is an essential constituent of various basic, eruptive rocks, in which it is commonly associated with some member of the pyroxene or amphibole groups, as in norite, gabbro, diabase and basalt. Anorthite occurs in gabbro, basalt and porphyry.

In most rocks the feldspar is in grains too small to be of commercial importance. The feldspar which is commercially valuable is that which occurs as a constituent of the pegmatites. These vary considerably in composition, but fall generally into two groups: (1) the granite pegmatites, being mainly quartz and mica, and (2) the soda pegmatites, which contain no quartz and little or no mica, but are principally soda feldspar (albite), with a little hornblende. Much the larger number of feldspar quarries in the United States are in granite pegmatites; only a few in southeastern Pennsylvania and adjacent parts of Maryland are in soda pegmatites. In size, the pegmatite masses vary from bands a few inches wide to deposits half a mile across and traceable for long distances. In form the masses are quite irregular, but more or less lens-shaped, intrusions along the planes of easiest rupture in the enclosing rocks.

In the granite pegmatites are found in addition to the feldspar an abundance of quartz, white mica, black mica and black tourmaline and smaller quantities of garnet, magnetite and beryl. If the feldspar is required for use in the manufacture of pottery, quartz up to a proportion of 20 per cent and some white mica are not objectionable. The colored minerals, however, are to be avoided. A quartz content of more than 20 per cent may be overcome by adding pure feldspar until the mixture comes down to that percentage. Some potteries demand feldspar in which the quartz content is not more than 5 per cent. The quarries are nearly all worked in open pits, some of which are of mammoth size, one in Glastonbury, Conn., having yielded over 200,000 tons, and another at Elam, Pa., over 100,000 tons. In a few instances short tunnels are used. The output is hand picked to remove the larger masses of mica and quartz and the colored minerals. This discarded material is used in making roofing. Feldspar is ground before marketing, sometimes being roasted in kilns before grinding, but the larger part is ground as it comes from the quarry. For use in the potteries, 99.3 to 99.8 per cent passes through a 100-mesh screen and 96.7 to 98.2 per cent through a 200-mesh screen.

The potash and potash-soda feldspars mined in the United States are mostly pale flesh-colored to nearly white. Soda feldspars are pure white or light gray and pale green. When ground, commercial feldspars are either white or very pale pinkish or salmon in hue.

Alteration.— The feldspars are often altered into other silicates such as talc, chlorite, or the zeolites, but much the most common change is the production of kaolin (see CLAY). Infiltrating waters containing carbon dioxide dissolve out the alkaline ingredients of the spar, which, entering into new combinations, form various secondary minerals, while the aluminum silicate becomes hydrated and forms kaolin. If the waters contain magnesium salts the feldspar may be altered to talc.

Forms.— Feldspars occur in massive, granular, lamellar, cleavable and compact forms, but crystals are very common. The monoclinic feldspars include orthoclase, or common feldspar, and the very rare barium feldspar, hyalophane. Triclinic feldspars include microcline, anorthoclase, and plagioclase or the feldspars of the albite-anorthite series, embracing albite, oligoclase, andesine, labradorite and anorthite, (that is, the soda-lime series). Descriptions of these minerals appear as separate topics. The feldspar group presents a striking illustration of the approximation in angle to forms of higher symmetry coincident with a wide difference in habit. In orthoclase, for example, the common planes *n*, *y* approximate very closely to the cube; *q*, to the octahedron; *m*, *b*, *c*, *o* to the dodecahedron, and *z*, *x* to the trapezohedron. Feldspar crystals usually appear prismatic and are often tabular parallel to the clinopinacoid, *b*. Twins of most remarkable variety abound, the commonest of which are after the Carlsbad, Baveno, albite and pericline laws (see CRYSTALLOGRAPHY). Polysynthetic twining is almost universal in the plagioclase feldspars, and, while best observed in thin sections with the polarizing microscope, it is often detected in large masses by the fine striations which so beautifully mark some of the cleavage faces of labradorite, oligoclase or albite.

Optical Characters.— Orthoclase is optically negative, with the axial plane usually at right angles to the clinopinacoid, *b*; but sometimes it is parallel to *b* and always becomes so when the temperature is increased to 600° to 1,000° C., this change also being produced by pressure. Microcline is also optically negative and the axial plane is nearly perpendicular to the *b*-pinacoid. Among the plagioclase feldspars the position of the axial plane changes with the composition, there being a regular progression in its position in passing from albite to anorthite. Albite is optically positive, anorthite is negative, while in some andesine, lying midway between them, the axial angle is practically 90 degrees. Microcline is distinguished from all other feldspars by the characteristic "gridiron" structure which is exhibited by thin basal sections when viewed under the microscope in polarized light. This is due to polysynthetic twining according to the albite and pericline laws. The plagioclase feldspars may usually be recognized in thin sections, between crossed nicols, by their characteristic polysynthetic twining, which manifests itself by parallel bands alternately dark and light.

Composition.— Common feldspars are crystalline compounds of silica, alumina, and one or more of the bases, potash, soda, and lime, and rarely baryta. There are two principal classes: (1) the potash, and potash-soda feldspars, and (2) the soda, soda-lime and lime feldspars.

Pure potash feldspars are orthoclase and microcline: they are alike in chemical composition and in physical properties, and for commercial purposes are practically identical. Their theoretical composition is: silica, 64.7 per cent; alumina, 18.4 per cent; and potash, 16.9 per cent. Potash feldspar usually contains some soda in place of the full theoretical complement of potash. If the soda content is greater than the potash content, the feldspar is called anorthoclase.

The theoretical composition of pure soda feldspar (albite) is: silica, 68.7 per cent; alumina, 19.5 per cent; soda, 11.8 per cent. Soda feldspars of the soda-lime group generally contain lime replacing a part of the normal soda content, or through the intermixture of lime feldspar.

Two or more of the various feldspars may be present in the same deposit, or even in the same crystal. None of the lime feldspars have a commercial value. The feldspar mined in the United States is of the potash or soda varieties, or a mixture of the two. Commonly, the potash variety predominates. The average potash content is 13 per cent, but taking the run of the mine, the yield of potash is not more than 10 per cent.

Orthoclase, or potash feldspar, is a potassium-aluminum polysilicate, $K\ Al\ Si_3O_8$. This compound is dimorphous, microcline, having an identical composition. Sodium often in part replaces the potassium, making soda-orthoclase or soda-microcline. When the sodium largely predominates the mineral passes into anorthoclase $(Na,K)\ Al\ Si_3O_8$; when it replaces all the potassium, the mineral is albite, $Na\ Al\ Si_3O_8$. Anorthite is a calcium-aluminum polysilicate, $Ca\ Al_2Si_2O_8$. Between it and albite lie various triclinic feldspars, which are regarded as isomorphous mixtures of albite and anorthite.

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FELEGYHÁZA, fā'ledy-hä-zo, or **KISKUN-FE**, kish'koon'fĕ, Hungary, town about 65 miles southeast of Budapest. Agriculture and grazing are the principal occupations of the people of the surrounding country and the trade is in cattle, dairy and agricultural products. Pop. 34,924.

FELIBIEN, fā'lē'byăṅ, **André**, French architect and historiographer: b. Chartres, May 1619; d. Paris, 11 June 1695. He was educated at Chartres and at Paris and in 1647 went to Rome as secretary of embassy to the Marquis de Marueil. In Rome he diligently studied the ancient monuments and the treasures in the libraries. On his return to Paris his ability was recognized by Fouquet and Colbert and in 1663 he was one of the first members of the Academy of Inscriptions. In 1666 he was appointed historiographer to the king and in 1671 became secretary of the new Academy of Architecture. Two years later he was named custodian of the cabinet of antiques in the palace of Brion. Subsequently he was made deputy controller-general of roads and bridges. He published several important works including 'Entretiens sur les vies et sur les ouvrages des plus excellents peintres anciens et modernes' (5 vols., 1666–88; reprinted with additions, Amsterdam 1706; Trévoux 1725); 'Origine de la peinture' (1660); 'Principes de l'architecture, de la sculpture, de la peinture, etc.' (1676–90), and descriptions of Versailles, La Trappe and of the pictures and statues of the royal palaces. He was a man of great probity and sought to conform his life to the motto he had chosen — Bene facere et vera dicere.

FÉLIBRES, fā'lē'br, **Les**, members of the Félibrige Society. See FÉLIBRIGE.

FÉLIBRIGE, fā'lē'brēzh', a local association of writers of the south of France founded at the Chateau de Font-Ségugne, 21 May 1854 for the purpose of promoting the literary and regional use of the langue d'oc and developing the peculiar life of this ancient tongue. The first article of the constitution of the society, as reformed in 1876, shows the spirit and aims of the organization to be «to bring together and to inspire with a common interest and object all those who, by their writings, help to maintain the language of the land of Oc, and likewise scholars and artists studying and working in the interest of this land.» The society was an attempt, on the part of a few, to revive the regional aspirations of the south, once so pronounced, but already to all appearances long dead. Naturally the promoters of the movements, carried away by their enthusiasm and their localism, placed an exaggerated value upon their work. This exaggeration and localism were well fitted to attract attention and to give the movement the proper advertising. According to the prophets of langue d'oc nationalism from a literary and linguistic-artistic point of view this ancient tongue of southern France had ever been and was still «the incarnation of love of country, of independence and of manly feelings and thoughts, the representation of the dignity of a race and the honor of a people.» «Let us throw aside all parties of a political nature and work for the upbuilding of our own southern land; for its literary artistic regeneration and for the intensification of our own local life» was the peculiar appeal of the members of the Félibrige. It came at a time when the people of the ancient Provençal tongues, not only in France but in Spain, had already begun to feel the movement of modern life, when the reviving influence of popular education had begun to penetrate, or rather, to percolate into the south. The appeal made throughout a distracted and divided Spain for a united national sentiment which should place the interests of the country before every other interest had met with an apathetic reception throughout Catalonia and all the Spanish Provençal districts; and across the border in France the same phenomenon was observable. The people of the langue d'oc, largely cut off from the people of the centre and north of France on account of their long-preserved localism and the strong provincialism of their various Provençal dialects, continued to live very much to themselves and to maintain an attitude of passivism toward the patriotic campaign of the leaders of thought of the rest of the country. But as soon as the organizers of the Catalán movement began to be active in Spain and the félibres to preach their doctrine in southern France, the whole Provençal land began to take an interest in those voices speaking to inhabitants in their own tongue and voicing their most extreme regionalism and their indifference to the somewhat theatrical appeals of the general movement for closer national unity and an exhibition of intenser patriotism and pride in the glorious achievements of France. A common sentiment bound together the Cataláns and the people of the langue d'oc; and the one encouraged the other in their local aspirations. Soon both began to protest against abuses to which they were subjected on the part of the central government in each case. At this critical moment the Félibrige movement turned the people of southern France to the glorious past of their Provençal ancestors and the writers and poets began to chant the prowess of the mighty men of the langue d'oc; while across the border the Cataláns were doing the same thing for the people of Catalonia and the other heirs of the Spanish Provençal tongue.

The Félibrige movement stood for the «racial development of the people of southern France free of all influence directly asserted from Paris.» It consequently protested against the acceptance of an interpretation of patriotism whose accomplishment would mean the disappearance of the langue d'oc and the blending of the peoples of the north, centre and south of France into one homogeneous mass of a uniform consistency, made of the same thought and stamp of education. «Let us have liberty to develop in our own way,» was the cry from the leaders of the south of France and the east of Spain alike; and this cry was but the expression of a feeling that had long been deep down in the hearts of the Provençal people.

In 1539 Francis I, by royal edict, prohibited the use of the langue d'oc in all public documents. After this date Provençal rapidly degenerated into a dialect and as such became more or less despised by the rest of France who began to look upon it as a sort of jargon. Yet numerous writers continued, from century to century, to use the old southern tongue as the vehicle for their expression. Thus the langue d'oc was, in a literary sense, more alive than its sister tongue, Catalán, from the middle of the 16th century to the middle of the 19th century, and the people as a whole were more ready for a langue d'oc revival than were the Catalans for a revival of their Provençal tongue. Notable dialect poets of the first half of the 19th century prepared the way for the Félibrige movement, among them being Fabre d'Olivet (1767–1825), the Marquis of Lafare-Alais (1791–1846), Pierre Bellot (1783–1855), Jacques Jasmine (1798–1864), Trasconais Desanat (1796–1873). These appealed to a continually increasing circle of readers and admirers; and readers and writers reacting upon one another increased the sectional feeling, which had begun to assert itself in 1823 on the publication of a collected edition of «troubaire» verses by 10 langue d'oc poets headed by the two Achard brothers. In 1839 the Archæological Society of Béziers offered prizes for the best compositions of a literary nature in langue d'oc. Bellot and Desanat, about the same time, began the publication of a journal in the southern tongue. This was really the beginning of the Félibrige movement, for it gave the local writers an organ through which they might make themselves heard and work together for the recognition of the tongue d'oc.

In 1852 a congress of «Provençal Trobadours» was held at Arles, under the presidency of Joseph Roumanille, a very popular young langue d'oc poet who had just published 'Li Provençalo,' a collection of poems by living langue d'oc poets. This work was warmly welcomed by the local press. The following year another successful congress was held at Aix; and this was followed by the publication of a second volume of poems by living langue d'oc poets, which was even more popular than the first. On 21 May 1854 seven Provençal poets, among them Roumanille, in a meeting held at the castle of Font-Ségugne, resolved themselves into the Society of the Félibres for the express purpose of re-establishing the «national tongue» of southern France. The other members of the society, all of whom subsequently became well known in the literary world of the langue d'oc, were Paul Giera, Jean Brunet, Alphonse Tavan, Anselm Mathieu, Théordore Aubanel and Frédéric Mistral. They at once began the publication of an «almanac,» printed in the popular tongue, and filled with short stories, verses, sketches and witty sayings. It was welcomed not only in the south but throughout all France and in Provençal Spain. Its popularity grew and its influence extended with every yearly issue. This was quite natural for it was in a class and a field by itself and the brightest and wittiest intellects of the langue d'oc country were interested in making it the best they could; for the «Almanac» soon gathered to itself a harvest of young writers, some of whom were destined to become of almost as great influence as the founders of the society. The new movement rapidly measured the depths of the langue d'oc whose capacity for the expression of the range of human activity and thought soon manifested itself.

Félibrige Writers.— The most talented, active and popular of the Félibrige writers was Frédéric Mistral who, at the age of 25, published his 'Mirèdio' (1859), a long narrative poem of considerable merit, which became immensely popular throughout all France. His popularity helped him in the battle for the cause of langue d'oc literature which he had so much at heart. In 1867 enthusiastic «Floral Games» were held at Avignon; and at these the guest of the occasion was Victor Balaguer, the most popular of the Catalán poets. The force of the Félibrige movement increased and, in 1876, a more extended organization of the Félibrige Society took place at Avignon to cover the four maintenances, Languedoc, Aquitaine, Provence and Catalonia (Spanish). At the head of the consistory of 50 members, who form the governing body of the association, is the capoulié, the first of whom was Mistral, who held the office from 1876 to 1884 when he was succeeded by Roumanille (1884–91). Then followed Felix Gras (1891–1901) and Pierre Devoluy (1901–), all of whom were literary men of talent. Mistral, the most influential of them all, did more than any other langue d'oc writer to expurge from the southern tongue foreign words that did not seem to him to have conformed to the genius of the native language. Gras enjoys the reputation of being the best prose writer and historical romancer of the Provençal country. He has also written several long poems. Roumanille had the true poetic touch and his poems, of which several collections have been published, are popular throughout France and Catalonia. Aubanel, too, has had considerable influence upon the younger generation of langue d'oc poets. He has also written good plays, the best of which, 'Lou pan dou pecat' had a success in French dress. Much of the most characteristic of the work of the Félibres has been translated into French and considerable of it into Spanish; and thus has increased the intensity of the Félibriges movement. Yet with all this apparent success, which seems to be to some extent at least artificial, the Félibrige movement is scarcely likely to make of Provençal anything more than the dialect that it is. The attempt to have it replace French in the south of France and to "break the shackles of French influence and oppression" as Mistral has expressed it, would be unfortunate were it to succeed, for Provence is no longer an independent race, whatever her poets may say to the contrary. Yet the Félibrige movement is still strong and scores of papers, magazines and reviews are published in Provençal. See Catalán; Catalonia; Catalán Literature; French Language.

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FELICISSIMUS. The author of a church schism in Carthage in the 3d century. At this time Cyprian was newly elected bishop of Carthage. Felicissimus was appointed deacon by Novatus without consulting Cyprian, who declared that his prerogatives had been encroached upon. At the time of the Decian persecution Cyprian was absent from Carthage for some time. Some presbyters on their own authority began to readmit the *lapsi* to the communion. Before his return Cyprian interfered and sent a commission to investigate. Felicissimus denounced him for this as encroaching upon his rights as a deacon, and his church became the centre of the *lapsi* wishing to have their cases decided quickly. When Cyprian returned in 251, a synod met and excluded Felicissimus from the Church and five presbyters who were his adherents. This did not silence him, but brought him other followers including several African bishops. Fortunatus, one of the five presbyters, was elected bishop of Carthage. Felicissimus was sent to Rome to win over Cornelius the bishop to their side but was not successful. Not long after, the schism seems to have ceased to exist.

FELICUDI, fä-lē-coo′dē (ancient Phœnicusa), one of the Lipari Isles, off the north coast of Sicily, 10 miles west of Salina. It is about nine miles in circumference, has rugged cliffs of basalt, and three lofty summits, evidently produced by an extinct volcano. The soil is both fertile and well cultivated. Pop. 800.

FELIDÆ, fē′lĭ-dē, the cat family, which contains the most highly developed of the order *Carnivora.* The characters of the family are the possession of a slender, extremely flexible body of great muscular power; the limbs five-toed, the thumb of the anterior limbs not reaching the ground; the skull relatively short, the facial portion much shortened, very broad, and giving, by its capacious zygomatic arches, a rounder outline, and abundant space for the powerful muscles which move the lower jaw. The incisors are three in number on each side, above and below; the powerful canines are trenchant on both edges, and are sometimes grooved; the premolars are three above and two below, the molars one above and below — in all, 30 teeth. The premolars are laterally compressed, the third upper tooth, the carnassial, or sectorial premolar, having only a minute inner tubercle. All are digitigrade. The divisions as given by Carus are: Sub-genus 1. *Felis.* Claws retractile; limbs low; tail as long as the body. A. Old World forms. (a) Lions (*F. leo*). Color uniform; a mane; Africa and western Asia. (b) Tigers (F. tigris). No name; body striped; whole of Asia, from the Altai and Amur to Java and the Cauccasus. (c) Leopards (*F. pardus*). Large species, with spots or rings, and round pupils; Africa and South Asia. (d) Serval (*F. serval*). Small spotted species; South Africa. (e) Cats (*F. catus*). Small, not spotted, sometimes striped; pupils elliptic vertical. B. New World forms. (a) Leonine. Color uniform, no mane. Puma (*F. concolor*). (b) Leopard-like. Jaguar (*F. onca*). Sub-genus 2. *Cynailurus.* Claws not quite retractile. Hair on neck and between shoulders, long, manelike. Cheetah (*F. jubata*); Africa and South Asia. Sub-genus 3. *Lynx.* With ear-tufts and short tails. A. Old World forms. Caracal (*F. caracal*) and chaus; South Asia and Africa. B. New World forms. Canadian lynx (*F. canadensis*); Red cat (*F. fasciata*); Bay lynx (*F. rufus*) — all in North America. The family was represented in Tertiary times by the cave-tiger (*F. spelea*); an American species (*F. protopanther*); and an Indian (*F. cristata*). *Machairodus,* within its enormous sabre-like upper canine, ranged from Miocene to Pleistocene times in Europe.

In addition to this formidable apparatus of cutting-teeth, the tongue is covered with small recurved prickles by which they can clean from the bones of their prey every particle of flesh.

There are no quadrupeds in which the muscles of the jaws and limbs are more fully developed. The skeleton presents a light but well-built mechanism; the bones, though slender, are extremely compact; the trunk, having to contain the simple digestive apparatus requisite for the assimilation of highly organized animal food, is comparatively slender, and flattened at the sides. The muscular forces are thus enabled to carry the light body along by extensive bounds, and thus it is that the larger felines generally make their attack. The five toes of the fore-feet and the four toes of the hind-feet of cats are armed with very strong, hooked, sharp claws, which are preserved from being blunted by a peculiar arrangement of the phalanges. For this purpose the claw-joint of each toe is drawn back by ligaments attached to the penultimate joint, till it assumes habitually a perpendicular position, when the claw which it supports is completely retracted within a sort of sheath, and is entirely concealed by the fur. When, however, the animal springs on its prey, the tendons of the flexor muscles of the toes, overcoming the elasticity of the retractile ligaments, pull forward the claws, and they are ready to be buried in the flesh of the victim. The lower surface of the foot is furnished with thick ball-like pads of the epidermis, on which the animal walks; this gives them the noiseless tread peculiar to this family.

Members of the cat family hunt in the gloom, and, consequently, while escaping observation, require every ray of light that can be made available. The pupil is a long, vertical fissure; but this only obtains among the smaller genera; in all of the family above the ocelot in size, the pupil is round in form. On the top of the skull there runs a tolerably high bony crest, which reaches its greatest elevation at the very back of the head. This bone ridge is necessary for the attachment of the powerful muscles which operate the jaws and enable the cats to drag away their often very heavy prey.

In the digestive organs of the *Felidæ*, the salivary glands are small, and the stomach of a simple cylindrical form. The œsophagus opens at its anterior extremity, and the intestine commences from the posterior; so that everything favors a quick passage of the food, which receives no mastication, and is retained a very short time in the stomach. The intestine has no valves, is small in diameter but muscular, and the whole canal, when compared with the length of the body, is extremely short, being as 3 or 5 to 1. In the domestic cat they are 5 to 1; but in the wild cat only as 3 to 1.

The *Felidæ* are now regarded as including only two genera, *Felis* and *Cynælurus*, the latter reserved for only one species, the chetah.

Wild cats are found in all parts of the world except Australia, but principally in the warmer regions, where alone the larger species are met with.

In the caverns and river deposits of the Quaternary Period in Europe and America are found fossil remains of cats allied to or identical with living species. Such are the huge cave lion of Europe (*Felis leo*, race *Spelæa*) and others not so well known. During the Tertiary Period they were rare, their place being taken by the Machærodonts or sabre-tooth tigers (q.v.), animals similar to cats in many respects, but less agile, more powerful, and distinguished by enlarged sabre-like upper canine teeth, which indicate different habits of attack on their prey. The appearance of true cats, both in Europe and America, is correlated with the abundance of modern types of ruminants, etc.— slender, thin-skinned, long-necked and swift-footed, in place of the powerful and heavily proportioned pachyderms common through most of the Tertiary Period. It is probable that both sabre-tooth tigers and true cats were evolved from the *Palæonictidæ*, a group of primitive carnivora or Creodonta in the early Eocene; but the proof from fossils is at present fragmentary and incomplete. See CAT; COUGAR; LEOPARD; LYNX, and other names of wild cats.

FELIX I, Saint, a citizen of Rome, reigned as Pope from 269–74. He excommunicated Paul of Samosata, bishop of Antioch, for teaching that Christ was no more than a mere man. A portion of a treatise on the Incarnation, written by Felix I, is still extant. He was martyred (274) in the Aurelian persecution.

FELIX II, Saint, a Christian martyr of the 3d century, who with his sister, Regula, was the first to preach Christianity to the inhabitants of Zürich. They were executed by Decius at the instigation of Maximian. Until the time of the Reformers, Felix and Regula were venerated as the patrons of Zürich. Their day in the calendar of saints is 11 September. Consult 'Mittheilungen der antiquarischen Gesellschaft zu Zürich' (1841).

FELIX II, Anti-pope. He occupied the pontifical see during the banishment of Liberius, 355. In reply to a proposition for the recall of Liberius, it was proposed by the Emperor Constantius that Liberius and Felix should reign conjointly, but the people exclaimed, «One God, one Christ, one Pope» and Felix had to give way. He is said to have died a martyr's death in 365.

FELIX III, Pope, succeeded Simplicius in 483, and died in 492. Under him began the Acacian schism, headed by Acacius, patriarch of Constantinople. Acacius was excommunicated by Felix III at the Roman Synod of 484.

FELIX IV, Pope from 526 to 530. He is noted for his promulgation of the 25 canons adopted by the Council of Orange (529) against Semi-Pelagians.

FELIX V, an Anti-pope: b. Savoy; d. Geneva 1451. He is better known by his rightful name and titles, Amadeus, Duke of Savoy, Count of Geneva and Cardinal. He was elected Pope by the schismatical Council of Basel (1439), and in 1449 submitted to Nicholas V who had been elected Pope canonically. Felix V is the last one of the anti-popes.

FELIX, Antonius, an-tō'nĭ-us fē'liks, Roman procurator of Judea. It was before him that Paul «reasoned of righteousness, temperance, and judgment to come.» Felix rose from slavery, having been manumitted by Claudius Cæsar. His rule in Judea, notwithstanding its severity or rather in consequence of it, was marked by constant disorders and disaffection; he was notoriously accessible to bribes, and but for the interest of his brother (the notorious freedman Pallas) with Nero, the charges carried up against him to Rome would have caused his ruin. Drusilla, «the Jewess,» his second wife, had been seduced by him from her husband, Azizus, king of Emesa. Tacitus paints Felix in the darkest colors — a character confirmed by what is related of him in the New Testament, that he had expected a bribe from

Paul, and that, disappointed in this, he left him bound, «to show the Jews a pleasure» (Acts xxiii, xxiv).

FELIX, Elise Rachel. See Rachel, Mlle.

FELIX, Marcus Minucius, Roman lawyer. He embraced Christianity, and wrote an excellent defense of it in a dialogue entitled 'Octavius.' The period when he flourished is uncertain, some making it as early as the reign of Marcus Aurelius, while others make it as late as that of Diocletian. The purity of the Latin style, and some of the allusions to the existing state of the Church, would seem to favor the earlier date; but it is not easy to set aside the direct testimony of Jerome, who, in a regular list of Christian writers, places him between Tertullian and Cyprian, thus fixing the period to about 230 A.D. The 'Octavius' has been translated into most European languages. Consult 'Ante-Nicene Fathers' (Vol. IV, 1889).

FELIX HOLT, THE RADICAL, a novel by George Eliot (1866). It is a picture of upper middle-class and industrial English life of the period of the Reform Bill agitation.

FELIXIANS, a Spanish sect of the latter part of the 8th century, so called from Felix, bishop of Urgel.

FELL, John, English prelate: b. Longworth, Berkshire, 23 June 1625; d. 10 July 1686. He was graduated at Christ Church, Oxford, 1643, took up arms for the royal cause, and later, at the Restoration, became dean of Christ Church, becoming vice-chancellor of Oxford 1666, which office he held till 1669. He displayed much interest in the development of the University Press, and in 1675 he was appointed bishop of Oxford. Among his works are 'The Interest of England Stated' (1659); 'The Life of Dr. Henry Hammond' (1661); 'Grammatica Rationis sive Institutiones Logicæ' (1673); 'The Vanity of Scoffing' (1674); and a critical edition of the works of Cyprian (1682), his greatest work.

FELL (Norw. *fjeld,* Swed. *fjäll*), the name given in Scandinavia to the bare plateaus which occur in its mountainous regions; they are destitute of vegetation, and generally lie above the snow-line. The word enters as a component into the names of innumerable mountains, owing to the fact that in their formation they have taken on the shape of a fell. Fell is also used in the north of England and south of Scotland to designate a barren hill or moorland ridge. See **Middlesex Fells.**

FELLAHS, fel'ạz, or **FELLAHIN,** fel'ạ-hēn, the people of Egypt who live in villages and cultivate the soil. The name signifies «tillers.» They form a large part of the population; are the most ancient race in that country, and are generally believed to be the descendants of the old Egyptians, their physiognomy resembling that which is found on the ancient sculptures. They are a patient and laborious population, and were heavily taxed before the period of English influence in the government. Under British training they have proved excellent soldiers. See Egypt.

FELLATAHS, fel-lä'täz, or **FULAHS,** foo'läz, native **Fulbe,** *fool bĕ,* a remarkable race, the original locality of which is unknown, but which is now widely diffused throughout the Sudan, where they form a kind of ruling aristocracy. The states or kingdoms of Senegal-Futa, Futa-Jallon, Haussa, Sokoto, etc., are in their hands, and they thus extend from Senegambia eastward to Lake Tchad. They are a mixture of Negro and Berber blood. In person they are decidedly handsome, and mostly of a light copper color. They have regular features, small mouths, and noses inclining to aquiline; silky hair and fine black eyes; and are tall, well proportioned and of erect and graceful figure. The Fellatahs are shrewd and intelligent; extremely active, polished and insinuating in their manners, and said to possess great bravery and perseverance. They are not very much inclined to trade or agriculture, leaving these chiefly to the subject peoples, but are cattle-keepers and horse breeders, and were slave-raiders at a recent period. They are mostly Mohammedans, to which religion they became converts about 400 years ago. In the beginning of the 19th century they spread Islamism through the Sudan and established their dominion over a wide territory.

FELLENBERG, Philipp Emanuel von, fē'lēp ā-mä'noo-el fon fel'len bĕrH, Swiss educational and agricultural reformer: b. Berne, 27 June 1771; d. Hofwyl, 21 Nov. 1844. The years 1795–98 he spent in traveling over France and Germany, visiting in preference the villages, and chiefly devoting his attention to the material, intellectual and moral condition of the agricultural classes. He became convinced that the cause of all the existing poverty and misery was the absence of sound and rational instruction, and that the remedy lay in combining with a sound general education special training for the pupil's future trade. On his return to Berne he devoted himself to the improvement of the social and intellectual welfare of youth. For this purpose he purchased the estate of Hofwyl, and established successively an institution for instructing the children of the poorer classes, a seminary for children in the higher grades of life, and a normal school. The pupils were all trained to work in the fields or at the bench, and the product of their labor was sufficient to cover the expenses of their education. Fellenberg's scheme was at first ridiculed by his countrymen, and looked upon for a time with some suspicion by the government; but ere long its beneficial results attracted even the attention of foreign governments. Alexander I of Russia conferred upon the philanthropist the decoration of Saint Vladimir, and sent seven young nobles to be educated at his institution. Several foreign princes visited the establishment, and founded institutions on a similar plan. The Fellenberg institutions still exist, though on a less extensive scale, and are partly carried on by his descendants.

FELLENBERG SYSTEM OF EDUCATION, Association of the. See Education, Agricultural.

FELLER, Henrietta (Odin), missionary: b. Montagny, near Lausanne, Switzerland, 1800; d. Grande-Ligne, Canada, 1868. Her family removed to Lausanne, where she was married to Louis Feller. The death of their only child quickened her religious sensibilities; she underwent conversion, and on the death of her husband devoted her life to missionary enterprises. In 1835 she arrived in Canada, and thereafter founded the Grande-Ligne Mission near Saint Johns, P. Q., in association with the Baptist Church.

FELLING, England, urban district in Durham County, on the Tyne, two miles southeast of Newcastle. It has chemical works, forges, factories and coal mines nearby. Pop. 25,200.

FELLOW SERVANTS, those employed by a common master in a common task, and so correlated that the safety of any one depends, in the ordinary course of things, on the care and proper conduct exercised by the others. The term is used especially in the laws governing the liability of employers to their employees for injuries sustained during their employment due to negligence or other fault on the part of a co-worker. This definition is sustained by the laws of England and by most State jurisdictions of the United States, but is rejected in some. For the various degrees of liability of the employer and the statutes of the several States consult Bailey 'The Law of the Master's Liability for Injuries to Servants' (St. Paul 1894) and McKinney 'Treatise on the Law of Fellow-Servants' (Northport 1890).

FELLOWS, Sir **Charles,** English traveler and antiquarian: b. Nottingham, Aug. 1799: d. London, 8 Nov. 1860. Without any claims to classical attainments, he collected unassisted a vast amount of material for the learned to labor upon. He first explored the valley of the Xanthus in Lycia, in 1838, and discovered the remains of the two cities Xanthus, the Lycian capital and Tlos. Under the auspices of the trustees of the British Museum he made further explorations in 1839 and 1841, and succeeded in obtaining the marbles now in the Lycian salon of the Museum. He was knighted in 1845. His principal works are 'The Xanthian Marbles'; 'Travels and Researches in Asia Minor'; and 'Coins of Ancient Lycia before the Reign of Alexander.'

FELLOWS, John, American author: b. Sheffield, Mass., 1760; d. New York, 3 Jan. 1844. His publications include 'The Veil Removed' (1843); 'Exposition of the Mysteries or Religious Dogmas and Customs of the Ancient Egyptians, Pythagoreans, and Druids'; 'Mysteries of Free-Masonry'; and a work on the authorship of the Junius letters.

FELLOWSHIP, an institution or feature of ancient origin in certain European universities, but of recent introduction in the colleges and universities of the United States. In an English university the fellowship entitles the holder, a graduate, who generally is called a fellow, to participate in the revenues of a certain college, or to have the benefit of a special endowment, and also confers a right to rooms in the college, and certain other privileges, as to meals, etc. Fellowships are generally forfeited upon the attainment of a certain position in the church or at the bar, and are retained after marriage only by special vote of the college. With these exceptions, the tenure was formerly for life, but many fellowships have altered in this respect. In Cambridge the tenure is now limited to six years. Both resident and traveling fellowships are granted for work in a special line. Formerly the value of some of the fellowships at Oxford and Cambridge was equivalent to $2,500, and even $4,000, but great changes have been made in the number of emoluments of the fellows at both universities. At Cambridge there are in all about 400 fellowships, some of the colleges having as many as 50 or 60 attached to them. The average annual value is from $750 to $1,250. At Oxford there are now two classes of fellowships, ordinary and tutorial. The emoluments of an ordinary fellowship are $1,000 a year, those of a tutorial fellowship usually $1,500. New fellows are generally elected by the head of the college to which they belong, and the fellows. There are also fellows connected with Dublin University, and in recent years a few have been attached to the Scotch universities as well as to the new English universities of Manchester, Sheffield, Birmingham and Leeds. In American universities many fellowships have been established by private individuals, to promote research in special departments of knowledge, there being in 1911 a total of 272 for the 13 leading universities. Fellowships are frequently awarded for study abroad, but others are for resident holders who, in some cases, give part of their time to instruction. Fellowships, unlike scholarships, are awarded to graduates only, and generally for post-graduate work. The Johns Hopkins University first used the system extensively. The value of fellowships varies greatly. The most common amount is about $500 per annum, but in some cases the income is only $120 and in others it reaches $1,500. Chicago University has nearly 80 fellowships and several other institutions from 22 to 55 each. Annual fellowships may generally be reassigned more than once to the same holder, and there are fellowships with a tenure of several years. There are several fellowships at the American schools of classical studies in Athens and in Rome, open to graduates of American universities. The distinction between fellowship and scholarship is one that is not very marked: the Rhodes scholarship, for example, may be regarded rather in the light of fellowship. The term «fellow» is also applied to members of the governing body of certain universities, as at Harvard.

FELO DE SE, fē'lo dę sē, from the mediæval Latin, felon or traitor to himself, is the legal technical description for a suicide. See Suicide.

FEL'ON. See Paronychia.

FELONY, in law, a term originally applied to those crimes which were punished by forfeiture of lands and goods, in addition to any other punishment prescribed by law. As so used it was distinguished from a *misdemeanor*, which was an offense that did not entail forfeiture as part of the penalty. The word cannot now be said to have any very definite meaning in law. It may be applied to crimes entailing capital punishment, as well as to others for which capital punishment is not inflicted; and is so applied by statute in the States of New York and Massachusetts. In many States the distinction between felony and misdemeanor has been abolished, an example that in time will probably be universally followed. Compounding a felony in refraining from prosecuting a felony for a consideration, constitutes a crime.

FELS, fĕlz, **Joseph,** American manufacturer: b. Halifax Court House, Va., 1854; d. 22 Feb. 1914. He entered commercial life as salesman for a soap-making concern and in 1874 set up a soap factory in Baltimore, which he later removed to Philadelphia. He amassed great wealth and becoming interested in the single-tax reform he established a fund for its promotion which is known as the Joseph Fels Fund of America. He also subscribed to funds for similar purposes in several foreign countries. He also aided single-tax colonies near Mobile, Ala., and at Arden, Del. He also lectured and wrote in behalf of the single-tax. He was one of the first employers in America to establish a profit-sharing system in his factories.

FELSITE. As a rock name, felsite is rather indefinite, but is a very convenient name for those dense fine-grained igneous rocks, usually gray but often red or green, that to the naked eye show no crystals of minerals. Felsites generally are ancient lavas containing a high per cent of silica, and are composed almost wholly of minute crystals of quartz and feldspar. The percentage of silica varies, and the relationship and probable origin of a felsite can be determined by analysis and examination with the microscope. Igneous rocks having a finely crystalline ground mass with visible crystals are said to have a felsitic ground mass, thus petrographers speak of felsite-porphyry. See ROCK; RHYOLITE; TRACHYTE.

FELT, Joseph Barlow, American historian: b. Salem, Mass., 22 Dec. 1789; d. there, 8 Sept. 1869. He was graduated at Dartmouth College 1813 and was ordained Congregationalist minister, having churches in Sharon, Mass., and Hamilton, Mass. In 1836 he was appointed to classify the Colonial and State archives of Massachusetts. His 10 years' work at this task was invaluable to the State, and he was recognized as an authority on New England history. He was recording secretary of the American Statistical Association 1839–59; librarian of the Massachusetts Historical Society 1842–58; and president of the New England Historic-Genealogical Society 1850–53. Among his works are ‹Annals of Salem› (1827); ‹History of Ipswich, Essex and Hamilton› (1833); ‹Historical Account of Massachusetts Currency› (1839); ‹Ecclesiastical History of New England› (1855–62); and ‹Collections for the American Statistical Association on Towns, Population, and Taxation› (1847).

FELT, from Dutch *vilt*, a fabric made from wool, or wool and hair, or fur, without weaving, by rolling, beating and pressure, generally with the use of lees or size. The process of felting is similar to that of fulling. The fibres of fur, hair or wool are rough in one direction only, and thus they can glide among each other in such a way that when the mass is agitated the anterior extremities slide forward in advance of the body or posterior half of the hair and serve to entangle and contract the whole mass together. Articles of felt, such as rugs, carpets, clothing and hats, have been made from remote antiquity, and are still made and widely used among various Asiatic peoples. Modern uses of felt include also carriage linings, pianoforte hammers, surgical dressings, etc. Legend ascribes the invention of felt to Saint Clement, who found that carded wool placed in his shoes to protect his feet while on a pilgrimage worked into a felt by the pressure and moisture; but it has a much earlier origin, being apparently known in Homer's time. The Saracens used it for tents, and it was probably introduced into Europe at the time of the Crusades. In Europe and America felt cloths are also made for several purposes, the finer kinds especially for carpets and tablecovers, which may be dyed or printed and finished in various ways. The first mechanical process for the making of felt was invented about 1820 by the American J. R. Williams. Various details have since been added, but the main principle remains the same. The wool is carded into laps of the length and breadth of the web to be made. Layers of these are placed one above another until the desired thickness is secured, the outer layers being generally of finer texture than the interior. The whole is now passed between rollers partly immersed in water. In the machinery by which felt fabrics are produced, rollers with a rubbing and oscillating movement have generally an important action. The materials commonly used for felt hats are the furs of the rabbit and other animals and the wool of sheep. The latter material is employed for common and medium hats, only the finer felt hats being made from fur. The hats after being stiffened are dyed. They now undergo the operation of blocking, in order to give them their proper shape. Coarse varieties of felt are used for covering steam boilers and cylinders, steam-pipes, and otherwise as non-conductors. Asphalted felt is a coarse felt saturated with pitch, asphalt or coal-tar and used for covering sheds and other buildings, and a superior kind called inodorous felt is used for lining damp walls. Another kind is asbestos felt. For some of these the process of manufacture is similar to that employed in making paper. In the United States the felt industry has about 45 establishments, producing goods valued at approximately $12,000,000 yearly. The principal products are felt cloths, boot and shoe linings, upholstery felts, trimmings and lining felt, felt shirts and belts for paper manufacture. Consult «Felt and Felting» in Murphy's ‹The Textile Industries› (Vol. II, London 1912). See HAT.

FELTHAM, Owen, English author: b. Suffolk, in the reign of James I; d. sometime in 1678. For many years he lived in the Earl of Thomond's family. Other than this very little is known of his history. He was the author of ‹Resolves Divine, Political and Moral› (1631). It has been printed in many editions; 12 appeared before 1709.

FELTON, Cornelius Conway, American classical scholar: b. Newbury, Mass., 6 Nov. 1807; d. Chester, Pa., 26 Feb. 1862. He graduated at Harvard in 1827. In 1834 he became professor of Greek literature at Harvard, in 1860 its president, and in 1858 regent of the Smithsonian Institution. His publications include many translations from German, French and Greek, of which ‹The Clouds› and ‹The Birds› of Aristophanes are the most distinguished; also ‘Familiar Letters from Europe’ (1864); ‘Greece, Ancient and Modern’ (1867); ‘Selections from Modern Greek Writers,’ etc. Consult ‘Proceedings’ of Massachusetts Historical Society for 1866.

FELTON, John, the assassin of the first Duke of Buckingham. He was a member of an old Suffolk family; the date of his birth and the name of his father are unknown, but his mother's name was Eleanor Wright, of Durham. He served in the army and was a lieutenant on the expedition to Cadiz in 1625. His moroseness rendered him unpopular and hindered his advancement. Buckingham refused all his applications for promotion because, it is alleged, of a feud between Felton and Sir Henry Hungate, Buckingham's favorite. Ill-treatment and poverty drove him to desperation and he began to regard Buckingham as the cause of all his woes. His animosity to Buckingham was intensified by the «Remonstrances» of the Commons and by the charges of Eglesham that James I had been poisoned by the minister. Felton, determined on the assassination of the Duke, bought a knife and journeyed to Portsmouth, where on 23 Aug. 1628 he stabbed Buckingham to death. The crime was popular, as the Duke was cordially hated by nearly all classes, and poems were written in praise of the deed. At his trial Felton pleaded guilty, and was hanged on 27 Nov. 1628.

FELTON, Samuel Morse, American railroad president: b. Philadelphia, Pa., 3 Feb. 1853. He was educated at the Massachusetts Institute of Technology, began railroad work as a rodman in 1868. He rose rapidly, becoming chief engineer, general superintendent and general manager of various railroad lines between 1873 and 1885. He was vice-president of the Erie 1885–90; the Memphis and Charleston, the Mobile and Birmingham 1891–93; and the Knoxville and Ohio 1891–92. He was president of the Louisville Southern and the Alabama Great Southern 1893–95; the Cincinnati, New Orleans and Texas Pacific railroads 1890–99; the Chicago and Alton 1899–1907; and the Mexican Central 1907–09. He was also receiver of the Columbus, Sandusky and Hocking Valley Railway in 1897–99, and the Kentucky and Indiana Bridge Company from 1893 to 1900. In 1909 he became president of the Chicago Great Western Railroad, and in 1912 of the Pere Marquette Railroad.

FELTRE, Henri Jacques Guillaume Clarke, Duc de, äṅ rē zhäk gē yōm klärk dük dė feltr, a marshal of France: b. Landrecies, France, 17 Oct. 1765; d. Neuviller, France, 28 Oct. 1818. In 1781 he entered the military school at Paris and was afterward imprisoned during the Revolution. He was subsequently employed by Carnot; in 1807 he became Minister of War and was created Duc de Feltre. Though indebted to Bonaparte for his dukedom he contributed toward the restoration of the Bourbons, was Minister of War 1815–16, and in the latter year he was created marshal of France.

FELTRE, fĕl'trā, Italy, town of the Province of Belluno, 32 miles northwest of Venice. It contains a cathedral, the Palazzo del Consiglio, now used as a theatre; a large fountain, an industrial school, hospital and municipal pawnshop. It has a few small industries, including ironware and baskets. It has a trade in silk, wine and oil. There is a monument to Pamfilo Castaldi, a native of Feltre, who, according to the Italians, discovered the art of printing. Feltre is the ancient Feltria and was a station on the Via Claudia between Opitergium and Tridentum (Trent). It was of little importance in Roman times. Pop. 5,468.

FELUCCA, fē luk'ä, a class of small merchant-vessels used in the Mediterranean. They have two masts, carrying lateen sails, and are capable of being propelled by oars, and frequently have a rudder at each end. Formerly feluccas were employed in war and piracy.

FEMALE RHYMES (Fr. *rimes, féminines*), double rhymes, or rhymes in which two syllables, one accented and the other unaccented, correspond at the end of each line. They are so called because they end in a weak or feminine syllable; thus, fable, table; motion, notion, are female rhymes.

FEME COVERTE, fĕm küv'ĕrt. See Husband and Wife; Family Law; Marriage.

FEMERN, fā'mĕrn, or **Fehmarn,** fā'märn, an island in the Baltic, taken from Denmark in 1864 and now part of Schleswig-Holstein, Germany. Area, 70 square miles; surface, level; soil, fertile, producing corn. Cattle are abundant. The inhabitants are mostly engaged in fishing, agriculture and stocking-making. Capital, Burg. Pop. 9,900.

FEMGERICHTE. See Vehmgerichte.

FEMINISM, from the French *féminisme,* Latin *femina,* woman: a word coined by the younger Dumas in a pamphlet entitled ‘L'Homme-femme’ (1872) to designate the so-called «rights of women» movement. An advocate of this movement is termed a «feminist,» though it must be pointed out that the definition, whether applied to a man or woman, by no means carries the somewhat derogatory sense of «effeminate» or «unmanly.» Indeed, many of the finest intellects among men have been — and are to-day — ardent feminists. Briefly stated, the tenets of the creed consist in a demand that women are entitled to absolute economic and social equality with men; that women have the right to participate in government as responsible citizens, and especially in framing such laws as affect their own lives. Hence, feminism includes woman suffrage, a stepping-stone to unlimited possibilities. Its foremost interpreters contend that woman has too long been regarded and treated as a mere adjunct of man; «a kind of subordinate beings, and not as a part of the human species.» This was the argument of Mary Wollstonecraft, the pioneer of the modern movement, in her celebrated ‘Vindication of the Rights of Woman,’ published in 1792. Although marred by numerous internal defects the ‘Vindication’ remains as one of the most powerful and truly prophetic statements of the woman's case against «man-made laws» and a «man-made world.» With merciless logic she flayed the miseducation of girls, ridiculed the generally accepted theories of «chivalry,» and mordantly attacked the double standard of morality. Yet she recognized, in true womanly fashion, that love and the attraction between the sexes was a cardinal fact in human nature, and "marriage as the foundation of almost every social virtue." While she claimed that women should be treated as the friends and equals of men, and not as their toys and slaves, she did not demand for women intellectual, physical or moral equality with men. She did not wish women to have power over men, but over themselves. In her time a sickly delicacy was supposed to be an essential part of feminine charm, and cowardice, as well as physical weakness, was regarded as part of what every woman ought to aim at. How far Mary Wollstonecraft was ahead of her time may be judged from the fact that she advocated woman's representation in Parliament nearly 70 years before woman suffrage was heard of in the House of Commons, and she proclaimed that the practice of medicine was particularly suited to women 50 years before the first English woman doctor was qualified.

Plato, Aristotle, Euripides and Sir Thomas More propounded arguments and theories on the rights of women that are to-day being carried into effect in America, Europe and Australasia. We have traveled far since that Council of Mâcon, quoted by Bescherelle and Larcher, where some 300 ecclesiastics gravely discussed the question of whether women could or should be classified as human beings. In ages past theologians and learned men have wrangled about the etymology of the word signifying "woman" in their respective languages, and whether the particular word was derived from God or invented by man. The object of these erudite disquisitions appears to have been to fix the definite status of woman as compared with man. Sympathetic French writers have proved to their own satisfaction that Nature, in her thousand-fold activity, is feminine in essence and that woman, not man, is the "lord of creation." Basing his argument on biological theory, Mr. George Bernard Shaw makes one of his characters say, "She [woman] knows by instinct that far back in the evolutionary process she invented him [man], differentiated him, created him in order to produce something better than the single-sexed process can produce," and that "he is welcome to his dreams, his follies, his ideals, his heroisms, provided that the keystone of them all is the worship of woman, of motherhood, of the family, of the hearth" ('Man and Superman').

However futile and unnecessary such speculations may appear to the 20th century understanding, it is indisputable that in nearly all ages and among most peoples — ancient and modern — women have been more or less kept in a state of tutelage and dependence upon men. So far back as records exist do we find a constant stream of depreciation leveled against women, in theology, philosophy and literature. The old Chinese classics contain numerous disparaging references to women, such as "long is her hair and short her understanding," despite the dictum of Confucius that "Woman is the masterpiece." With deeper insight, Socrates remarked that "woman, once made equal to man, becometh his superior." The contradictory absurdities of Rousseau were sufficiently answered by the tender profundity of Jean Paul. Lord Chesterfield ranked women as below men and above children; Tennyson says, "Woman is the lesser man"; Lessing wrote, "nature intended that woman should be her masterpiece," and Herder called her "the crown of creation." Sheridan states that "on the cultivation of the mind of women depends the wisdom of men," a truism elaborated by President Garfield, that "the most valuable gift which can be bestowed on women is something to do, which they can do well and worthily, and thereby maintain themselves." Horace Greeley expressed the opinion that nothing "will render the condition of our working women what it should be so long as the kitchen and the needle are substantially their only resources," while the late G. W. Curtis declared that "the test of civilization is the estimate of woman." That education must be the foundation stone of woman's rights was already realized in 1697 by Mary Astell, an English authoress, who published a work entitled, 'A Serious Proposal to the Ladies, wherein a Method is offered for the Improvement of their Minds.' She propounded a scheme for a ladies' college, which was favorably received by Queen Anne and would have been carried out but for the opposition of Bishop Burnet. A noteworthy phase in the history of woman was the so-called "age of chivalry," from the 10th to the 15th century, a time in which it was the duty and pleasure of every gentleman to be the slave of some lady. Though there can be little doubt as to the lax morality which accompanied it, that chivalry resulted in the modern idealization of women, and awakened in them the consciousness of their power and latent responsibility. But a formidable barrier of age-long custom and prejudice stood in the way — especially the "man-made laws." An old philosopher once remarked that "nature had already invested woman with such tremendous power that the law, wisely, gave her less." While it is true that, among some of the ancients, women exerted enormous influence in matters of state and inheritance of thrones and property, the vast majority of the sex were unaffected; distinctions fell to the favored few, either through lineage — relationship with men — or the natural gifts of intelligence and beauty. Homer sang —

"What mighty woes
To thy imperial race from woman rose,"

which leads to the conclusion that the heroines of antiquity were more absorbed in their private affairs than in those of the state or of their inconspicuous sisters.

The "Rights of Man," born of the French Revolution, kindled a feeble but inextinguishable rushlight which was sedulously fanned for over a century by an ever-increasing army of pioneers before it burst into flame. The English Reform Bill of 1832 prevented woman suffrage by the insertion of the word *male* before *person*. The advocates of feminism met with the most strenuous opposition alike from clergy and laity, and particularly from "the man in the street." There were those who prophesied the loosening of family bonds and the general collapse of human society if women were raised to a social and political equality with men. As was inevitable, the problem of sex became the predominant factor in the controversy. A strong grievance of the feminists was the stringency of the English divorce laws, at all times unjustly severe upon the woman. In 1854 the Honorable Mrs. Norton privately circulated a pamphlet entitled, ‘English Laws for Women in the 19th Century’— a painful episode of personal history more weighty and pregnant in its simple details of much wrong and suffering than sheaves of subtle controversy. In July 1855 Mrs. Norton addressed a letter to Queen Victoria on the «Laws of Marriage and Divorce,» in which she laid bare her own domestic unhappiness. The letter was dissected and analyzed in periodicals and press, attracting sympathy both for the writer and the feminist cause. At that time a special act of Parliament was necessary in each case to annul a marriage. In 1869 John Stuart Mill's ‘Subjection of Women’ appeared, a work marked by generosity and love of justice. He made a most effective protest against the prejudices which stunted the development and limited the careers of women on no other ground than «the accident of sex.» Notwithstanding that it encountered much criticism, the book gave a strong impetus to the feminist movement throughout the world, being also translated into other languages. In 1867 Mill had introduced in Parliament a bill for female suffrage for imperial affairs, which was defeated by 196 votes against 73. Mrs. Mill wrote an able essay on ‘The Enfranchisement of Women,’ and numerous pamphlets and magazine articles spread the propaganda. In 1868 the Court of Common Pleas in London decided female suffrage to be illegal, and in the following year the State of Wyoming granted women the vote. By degrees the scope of women's activity widened in those fields for which their endowments peculiarly fitted them, in all that involved moral superintendence and personal administration — in educational, charitable, penal and reformatory institutions. From the original «emancipation» and «politico-social equality» stages the feminist campaign assumed a definite economic aspect. With the growth of population it became increasingly necessary to provide employment for women and girls. Hitherto there had been little or no choice for women to earn their living beyond domestic service, in factories, as governesses or teachers. Men resented the invasion of their spheres by women on the ground that the cheaper female labor would cause a lowering of masculine wages. To the male argument that «woman's place is in the home,» the feminists retorted that not all women had homes, husbands and children, and that a woman should be as free to choose her career as any man. Especially hard was the lot of the single woman and the widow left unprovided for in the days when there were so few avenues for female activities. Jules Simon, French philosopher and statesman, pointed out in ‘L'Ouvrière’ (1861) that woman is a being naturally fond of work, uneasy of inaction, and loving employment for its own sake. A woman writer of that period expressed this restlessness: «How many women are now waiting, with empty hands and longing hearts! Will not good men lend us their aid to *bring us and our work together?*» The numerous benevolent societies that were necessary in Great Britain during the early Victorian era for the relief of «distressed gentlewomen,» governesses and female invalids bore testimony to the pathetic helplessness and silent suffering of genteel poverty among single women and widows. The Society for Promoting the Employment of Women labored to open out for them less thronged and footworn tracks than those of tuition and needlework, by directing their efforts toward printing and the semi-mechanical arts; above all, in facilitating emigration to the colonies by supplying agents to receive and protect them on their arrival overseas. The lack of educational opportunities was the severest handicap to woman's progress. «In imaginative strength she has been proved deficient,» wrote a critic; «she unfolds no new heaven, she breaks into no new world; she discovers, invents, creates nothing.»

After the repeal of the «combination laws» in 1825, British workmen gradually began to build up those trade unions which later became such a powerful factor in industrial life. Women were not slow to perceive that organization meant strength, political as well as industrial. Public meetings were arranged and the first meeting of the Manchester National Society for Women's Suffrage was held in 1868, exactly 20 years after a similar convention — the first of its kind — had assembled at Seneca Falls, N. Y. In 1869 a Women's Club and Institute was opened in London, much to the surprise and consternation of the male element. The theory of «the weaker vessel» became an exploded myth. Nearly 200 years earlier, Anne Hutchinson had started the first women's club in America, and French women had formed themselves into clubs in Paris during the Revolution. The feminist movement gathered in strength and momentum among the English-speaking peoples. One barrier after another was broken down by indefatigable and determined women leaders supported by many prominent men. Women had played a most important part in the abolition of black slavery; they were now bent on destroying what the extremists called «white slavery»— their own emancipation. Quite a large number of women were unconvinced of the wisdom of the movement, forming «anti» societies and declaring that most women did not want the vote and had no desire to «mix in politics.» Not a few of these objectors were ladies of high station and titles. While fully agreeing that the deliverance of women from early prejudices and unnatural trammels was a necessity which the development of culture and the altered conditions of industrial relations were bound to bring about in time, they were «convinced that the pursuit of a mere outward equality with men is for women not only vain but demoralizing,» and that it led to «a total misconception of woman's true dignity and special mission.» It was pointed out that the question was preeminently one for the middle classes to decide. While the ladies of the «upper ten» stood aloof, it could have no interest for the women of the lower orders, whose right to help their husbands in providing a living was, unfortunately, but too well established. Particular stress was laid upon the danger of economic competition, of overflooding the labor market. «Women take the places of men for less pay,» wrote a lady anti-feminist 25 years ago; «the lower a man's earnings, the less is he able to make a home for a wife. Competition between men and women would but tend to still further lessen the ever-decreasing number of marriages. . . . And it is just this decrease in marriage . . . which is the sore point in woman's emancipation. *The decrease in marriages first started the question of Woman's Rights.*» The words quoted were written by Mme. Adele Crepaz and received the commendation of Gladstone.

The feminists, however, pursued their campaign with increasing vigor and persistence. They invaded not only innumerable trades and handicrafts, but also universities and colleges, carrying off degrees and honors in science, law, classics, medicine, mathematics, philosophy, art, music, literature and political economy. They opened women's medical colleges, hospitals and educational institutions. They founded great political organizations numbering many thousands of members; they held gigantic parades and demonstrations; and terrorized legislatures and statesmen by actual display of physical violence. Women were elected to education, municipal and trade union boards; to administrative positions on public works, and appointed as government inspectors, as police officers, and even as sheriffs. A woman scientist discovered radium; women have gained certificates as ships' pilots and aeronauts; women travelers have explored Africa and Asia; a woman rode on horseback across the continent of Australia, while in France women practise at the bar. In the United States the first woman has entered Congress. Most of this remarkable expansion of feminine activity has taken place within the period of a generation, though the hardy pioneers who laid the foundations of the «era of woman» did not live to see the completion of their work. If the amazing results obtained up to the summer of 1914 forced the conclusion that women, given the needful opportunities, were but little behind men in productive — if not creative — energy, the course of the European War must have removed the last doubts that still lingered in the minds of anti-feminists. It is no exaggeration to say that the war gave woman the greatest opportunity in history to display her mettle and capacity. There are, however, two widely divergent views as to the ultimate consequences or effects of the war upon woman's life. In all the belligerent countries — though to a less degree in America — the war has imposed a heavy burden upon the women. In the European countries women have replaced men in almost every sphere of activity. In the munitions factory, in the workshop, on the street and on the land, women are performing the most arduous tasks such as had never fallen to their lot. It is believed by not a few that this violent experience must alter the nature of those women; that those who have learned to be well paid for their labors will gain economic independence, become hardened, and lose their womanly attributes. Such a contingency, it need hardly be said, would be an unspeakable disaster. On the other hand, it is expected that the physical exertion involved will produce a stronger, healthier race. Doctors have observed a considerable decrease of nervous disorders among women in general, while the women of the wealthier classes were said to have «forgotten their ills by from one-third to one-half.» This was said to be due to the numerous war activities to which women devoted themselves, in Red Cross work, etc. One physician in New York stated that since the war «a breath of fresh air» had come over the physical habits of all women, especially improvement in the «fashionable slouch» walk, which he attributed to the unconscious influence of the military.

Another serious problem is the question of those girls and women who took the places in offices to relieve men called to the colors. Will these drift back into private life when the men return? Already entrenched in business positions by the invitation and acquiescence of man, woman's position must necessarily be strengthened in the business world and her labor become more indispensable as time passes. It is not impossible that in America as in Europe the situation will adjust itself with a fair degree of equity, the qualified woman holding her place and the qualified man holding his, with the unfit of both sexes automatically falling out of the ranks. In Great Britain, less than 2,000,000 women were employed before the war, mainly in textile mills. In June 1918 there were over 4,500,000 women and girls employed under the Board of Trade. Their devotion to the national cause has earned them the Parliamentary vote for which they had struggled in vain for many years. The suffrage bill passed the Commons by a vote of 385 to 56.

In France the feminist cult has never been strenuously practised; the professions did not appeal to French women. Satisfied to cultivate the domestic virtues, their highest aims were to be good housewives. During the war they proved themselves no less patriotic, self-sacrificing and brave than their men. While there is no demand for the vote, the war is expected to raise the political status of women, but, according to M. Stephane Lauzanne of the Paris *Matin*, «they will prefer to exercise it through their husbands and in their social life, rather than through the coarse medium of the ballot box.»

In Germany the feminist movement has not flourished. In her book, 'Die moderne Frauenbewegung,' Dr. Kaethe Schirmacher states that «the political training of the German man has not yet been extended to include the principles of the American Declaration of Independence . . . his respect for individual liberty has not yet been developed as in England; therefore he is much harder to win over to the cause of women's rights.» She says that «Every war, every accentuation and promotion of militarism is a weakening of the forces of civilization and of woman's influence.»

Despite the backward political and educational conditions obtaining in Russia before the war, the position of intelligent women was not without hopeful prospects. There were numerous female doctors and teachers, many of them trained abroad. In Austria-Hungary and Italy circumstances were less encouraging, woman labor being poorly paid, while in Spain the feminists have been unable to attract much support. Farther afield, the leaven of Western influence is perceptibly operating in the Orient; female enlightenment is slowly penetrating into the harem and behind the *purdah*, smuggled through the barriers of antiquity by white women doctors and missionaries. Japanese and Chinese women who have visited the United States or Great Britain cannot fail to take home with them the new gospel of free and independent womanhood.

As mentioned above, it is in the English-speaking world that women have made the greatest strides toward the feminist goal of absolute economic, social and political freedom. The women of the United States, especially, have played a tremendous part in the creation and development of their country, a country which Europeans, not without justice, call "the woman's paradise." How far is feminine influence in America responsible for the disconcerting mixture of idealism and practical sense, the shattering of conventions and ignoring of obstacles, that blind yet unerring faith in individual action, and that callous neglect of all those inhibitions which arrest wild impulses? This intellectual and spiritual activity, moreover, has been communicated to millions of immigrants from all parts of the world, of diverse races and nationalities. Whether the full participation of women in what was once regarded as exclusively masculine activity will evolve a "third sex" — as feared by the pessimists — remains to be seen. Man has struggled, fought and bled for religious, political and economic freedom during centuries, and modern woman has emulated his example. Her insistent demands for self-determination and self-expression have gradually and inevitably forced their recognition. See DIVORCE; WOMEN IN THE INDUSTRIES; WOMAN SUFFRAGE.

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FEMMES, Savantes, fạm sạ'vänt, **Les.** See LEARNED LADIES, THE.

FEMUR, fē'mur, the large bone of the thigh. The femur is the chief supporting bone of the lower limbs and is in man the main organ of locomotion, for the larger muscles of the thigh and hip are attached to it. It is the largest and longest bone of the body. The upper extremity includes a head, neck and two bony protuberances which give attachment to the muscles rotating it. The head fits into the socket in the hip-bone, making a ball-and-socket joint. (See HIP-JOINT). It is this joint that so frequently becomes affected in tuberculosis, resulting in deformities, and also at this joint that the dislocation of the femur takes place. The main shaft of the femur is nearly circular above; below it is somewhat flattened, and running throughout its entire posterior surface there is a rough ridge to which muscles are attached. The lower end of the femur is enlarged, and has two surfaces to articulate at the knee with the tibia and fibula of the leg. These are known as the internal and external condyles, the external one being the broader, the internal the narrower and more projecting behind and to the sides. The upper portion of the front surface of the lower end of the femur is grooved to receive the patella or kneecap. The femur averages about 18 inches in the male, and is about one inch shorter in the female. It is inclined inward at an angle of about nine degrees in the male. In the female, by reason of the comparatively broader pelvis, the angle of the femur inward is greater. Consult Gerrish, 'Human Anatomy' (1902). See SKELETON.

FEN, a place overflowed with water, or abounding with bogs, as the bogs in Ireland, the fens in Lincolnshire, Kent, and Cambridgeshire. These fens abound in duck, teal, mallards, pike, eels, etc., and an herbage that is very nourishing to sheep and cattle. The soil of fen lands is generally black and rich to a depth of two or three feet.

FENCE, a structure or other barrier set to fend or ward off trespassing upon the lands enclosed. In most of the States the common law does not demand of an owner of land that he build a fence around it, but does require of an owner of cattle that he restrain them within fences upon his own land. But in the case of adjoining owners, one of whom pastures cattle upon his land, the law requires that each build one-half of a fence upon the dividing line between them, and that each keeps his half in repair. The common saying in the farming districts is that a fence must be «horse high, bull strong, and pig tight»: that is, so high that a horse cannot jump it, so strong that a bull cannot throw it down by charging it, and so tight that a pig cannot crawl through it. In most of the States the legal height is four feet, in some it is four and one half feet. In most of the grazing States of the West and Southwest, the duty of protection by fences devolves upon the owner who desires protection. An owner without fences runs his own risk of damage by roving cattle. In England a ditch constitutes a fence in law.

The simplest fences, common in farming districts, are the snake or worm fence, and the post-and-rail fence. The former is built up of split rails or saplings laid in zigzag panels, the ends of the rails of one panel intersecting alternately with the ends of the next panel, with a pair of stout stakes driven into the ground at each side of the intersections to hold the fence upright. A modification of this fence results from the straightening out of the zigzags, and the tying of the stakes at the top with a withe or wire. Another of the cruder forms of the snake fence is the «grasshopper,» or stake-and-rider fence, in which the stakes are long and inclined so as to cross at about six rails above the ground, and the rider rail is laid in the crotch thus formed. An advance upon these primitive fences is the post-and-rail fence, the posts having (usually) four holes mortised through them, which receive the opposite ends of two lapping rails in each mortise. Another rough fence is the board fence, a simple line of posts 12 to 16 feet apart, according to the length of the boards, which are nailed on lengthwise. An ornamental variation of this type of fence has the boards cut in short lengths and nailed on upright upon fencing strips set horizontally between the posts, the line at the top being scalloped on each panel. The picket fence is of better workmanship, the panels being framed on the posts, and the pickets of various sizes, and set with many ornamental variations of design.

Another fencing material of universal use is galvanized iron wire, either round or as a narrow ribbon, and with or without barbs. This is fastened by staples, as many strands as necessary for the purpose, to posts set at considerable distances apart, and braced to stand the lateral strain required to stretch and keep the wires taut. The posts may be of wood, in which case the end set in the ground is charred, or treated with creosote oils. Or they may be of reinforced concrete, either solid or hollow. If wood is used, locust and red cedar are preferred as longest lived, with chestnut second choice. A great deal of wire fencing is made by machinery which weaves it into oblong meshes of various shapes smaller at the bottom and larger at the top. Besides this ready made factory fence, machines are furnished for weaving the fence upon the posts in the field. Several combinations are produced in this line, some with wooden pickets twisted into horizontal wires, or with flat or round wire pickets. These fences are cheap to buy, and very economical in endurance. In some localities cast iron fencing is in vogue, and some handsome imitations of hammered wrought iron are produced. This type of fence when set with red brick posts or mounted upon a low red brick wall is very pleasing in appearance, and of great durability.

Stone fences are sometimes mere heaps of loose stones, but oftener are carefully laid up with dry wall faces, when they are sightly and most durable. The masonry fence lends itself to architectural treatment, and many most artistic effects have been produced especially in the matter of gateways. Rustic fences of cedar and arbor vitæ are always attractive in rural surroundings, but need frequent repair.

In more recent years the concrete fence has come much into favor, especially where ornamental effects were striven for. Chief of these are the bold treatment of posts outstanding from the line of the wall at equal intervals, with well-proportioned paneling between, and decorated with square, oval or round medallions. Variety is also given by mixing the cement with variously colored sands, broken brick or coal screenings, or adding red or yellow earths to secure special tints, and gravel or broken stone of different sizes to gain texture. Textural effects are heightened by playing a hose upon the green cement, or using a sand blast on the dry wall.

Live fences, or hedges, are highly favored in most localities. Privet, locust, osage orange, the buckthorn and cockspur thorn, the rose of Sharon, and the Japanese barberry are among the best of the deciduous plants used for hedges. Among the evergreens, arbor vitæ, juniper, box, hemlock, and spruce are eminently satisfactory.

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FENCE LIZARD. See SCELOPORUS; SWIFT.

FENCE-VIEWERS, town officers in New England to supervise the erection and repair of fences along the highways, or of boundary fences between private owners if called upon by either party. In early colonial days they had other duties also, including that of building inspectors.

FENCED CITIES. Frequently mentioned in the Old Testament scriptures. The village seemed always to be unwalled. The cities were «fenced in with one or more walls, crowned with battlements, parapets and having towers at regular intervals.» These were made for watchmen in war time or for the placing of engines of warfare. The cities were usually built on mounds or hills that they might be the better defended. The walls were of solid masonry, sometimes including very large stones. Occasionally a wall would be built within a wall. In the centre of the city there was usually an acropolis or citadel built as nearly impregnable as possible, and often made the last refuge of a besieged host and was defended to the very last.

FENCING, the art of attack and defense, with any weapon having either a point or an edge. In the general acceptance of the word, it means the use of the sword or foil, particularly the latter. All swords may be divided into two general classes, small swords and broadswords; the former being one with which the attack is delivered with the point only, the latter one that has a cutting edge.

The foil used in fencing represents the small sword. The earliest swords of which there are any authentic records were those of the Assyrians and Greeks. They were straight or leaf-shaped, and made of bronze. The swords of the Romans were of steel, short, straight and double-edged.

Light armor was worn by both the Greeks and the Romans, and a shield was carried for defense. During the Middle Ages when complete armor was worn, the sword was a long, heavy weapon used for striking blows, reliance being placed entirely upon the armor for defensive purposes.

When, after the invention of gunpowder, armor began to be discarded, it became evident that some other means of defense must be discovered, and it was in meeting this need that the art of fencing came into existence. The Italians were the first to recognize the fact that the point was more deadly than the edge, and that a thrust could be delivered more quickly than a blow, and to them belongs the credit of laying the foundation of the present school of fence. They invented the rapier, a long, straight sword having a cup-shaped guard with quillons, which was the parent of the small sword and foil. The early rapier was a weapon of offense only, parries being made with a dagger held in the left hand, or the point avoided by a leap aside. Camillo Agrippa of Milan was the first man to divide the body into four parts and to assign a definite guard to each. Agrippa published a book in 1553 explaining his system, which is said to have been illustrated by Michelangelo.

When daggers ceased to be worn, the cloak wrapped around the left arm was used in parrying. Later as the art of fence became better known, even the cloak was discarded, and the sword became a weapon of defense as well as offense.

While the Italians were building up their school on practical lines, the Spaniards invented a most complicated system of fence based on mathematical and geometrical principles. It was, however, of little use in actual fighting save that it taught coolness. The French and English were both followers of the Italian school, rapier play being introduced into England during the early part of Queen Elizabeth's reign. During the 18th century, the rapier, which had been constantly growing lighter, was replaced in France by the small sword, a weapon almost as light as our modern foil. The Italians, however, still clung to their ancient weapon and hence arose the two rival schools of fence, the French and the Italian. Fencing masks also came into use at this time.

Broadsword play in some form or other was in existence during the periods of both the rapier and small sword and did not differ in its essential features from the system in use to-day. The Scots have always been especially noted for their dexterous use of the claymore, a species of heavy broadsword.

The French foil used in fencing consists of a quadrangular-shaped blade about 33 inches long, mounted in a slightly curved handle, and having either a bell-shaped or ring guard. The blade is divided into two imaginary parts, the part nearest the point being termed the «feeble,» that nearest the guard the «forte.» Parries are made by opposing the forte of one blade to the feeble of another. The foil is held in the right hand with fingers underneath, the thumb extended along the upper part of the handle and nearly touching the guard. The thumb and forefinger direct the blade, the grasp of the other fingers being tightened or relaxed as occasion requires. In coming «on guard» the fencer raises his hand to the height of his breast, curves his arm so that his elbow will be about six inches from his body, and places the point of his foil on a level with his adversary's eye. At the same time he places his feet at right angles, about 12 inches apart, with the right foot in front, bends his knees, keeping the weight of the body slightly more on the left leg than on the right, and curves the left arm so that the hand will be behind the head. For fencing purposes, the body is divided into inside and outside, and high and low lines; an inside line being one to the left of the blade, an outside line one to the right of it; a high line one above the hand and a low line one below it. The high inside lines are termed Prime and Quarte, the low ones Septime and Quinte. The high outside lines are Tierce and Sixte, the low ones Octave and Seconde. All attacks, no matter how complicated, must eventually be delivered in one of these lines. For each attack there is a simple and a counter parry. Simple parries are made by turning aside the opposing blade in the line in which the attack is delivered; counter parries are made by circling round the blade and carrying it off in the line from which the attack began. To deliver an attack, the right hand is raised quickly to the height of the face, the right arm straight, and the point directed against the place to be attacked. At the same time, the left leg is straightened, the right foot advanced and the left hand dropped to a position about four inches above the left knee. This movement is termed the «Lunge.»

Whenever fencers are in the position of guard opposing each other, they are said to be «engaged.» Carrying the blade into another line is called «disengaging.» An opening for an attack is made by feinting in one line and attacking in another by forcing the blade aside, or by a combination of these movements. After a parry, a fencer delivers a return thrust termed a «Riposte,» with which he endeavors to hit his opponent before he can recover his guard.

Hits only count when the point is placed squarely on the jacket between the neck and the hip. Disarming does not count and is not now practised to any great extent. The Italian foil is a trifle longer than the French one and has a straight handle, a bell guard and quillons. It is held by hooking the first and second fingers of the right hand around the quillons, the other fingers being tightly grasped around the handle, while the thumb is placed over the flat piece of the blade which is between the guard and its crosspiece. Further rigidity of the grasp is often assured by binding the foil tightly against the wrist with a long piece of tape. When on guard, the right arm is nearly straight, on a line with the shoulder, with the point directed at the opponent's chest. The body is always more effaced (turned away from the opponent) in the Italian school than in the French. The Italians divide the body into eight lines, as do the French, but as a general rule they use only four of them (quarte, tierce, septime and seconde) in making their attacks. Their parries are made more forcibly than those of the French; in some of them the movement of the forearm being very pronounced. The Italians fence much more vigorously than do the French and have a number of startling tricks, such as dropping under, or stepping away from the opposing blade, which they have retained from their old rapier play. The dueling sword is a heavier kind of foil, having a triangular blade and a large bell guard. It is used in nearly the same manner as a foil, but a hit may be made with it upon any part of the person.

In the use of the broadsword the attack is delivered with the edge rather than with the point. A limited number of thrusts can be made with it, but it is primarily a cutting weapon. The swords used for this kind of fencing are of various weights and shapes, the majority of them, however, are of the sabre model, with blunted edges and rounded points. Wooden singlesticks are also used. In assuming the position of guard, the sword is held in the right hand with the thumb extended along the back of the grip, the edge to the right, with the hand at the height of the breast. The positions of the body and the feet are the same as in foil fencing, but the left hand is placed at the small of the back instead of behind the head. Attacks with the broadswords are made by giving a cutting blow with the edge. Cuts are made for the head, cheek, chest, girdle, flank, thigh, leg and arm. Thrusts with the point may also be made at the body. Cuts are parried with the edge; thrusts, with the back of the blade.

The student corps of Germany have a system of fence with a long straight sharp sword called a *schläger,* which differs from sabre play, in that the cuts are directed solely against the head. In this kind of fencing, masks are not worn, the eyes, ears and throat alone being protected, the sword arm is heavily padded and the blows are made with a wrist movement only.

The Japanese have a method of sword play which differs greatly from any of the present European systems. Their sword is a weapon some two and a half to three feet in length, having a heavily backed blade, a very sharp edge, a long handle and a small protecting guard. It is wielded with both hands, the right hand being placed close to the guard and the left hand grasping the end of the grip. The first two fingers of both hands control and direct the blow, the grasp of the other fingers being tightened or loosened as occasion requires. The edge is generally kept downward while on guard. Cuts are made for the head, wrist and waist, and thrusts for the throat and abdomen. A marked peculiarity of Japanese fencing is that parries are always made with the back or side of the blade, never with the edge. Bamboo swords are used for practice.

The bayonet attached to the end of a rifle makes a formidable weapon which is wielded in the same general manner as the small sword. In the position of guard, however, the left foot is in front, and the piece is grasped at the small of the stock, with the right hand, and at the balance with the left. When employed against cavalry the footman endeavors if possible to attack the horseman from the left side.

Among the famous fencers of the past, four men stand out pre-eminently. These were the Chevalier de Saint Georges; the Chevalier d'Eon de Beaumont; Henry Angelo; and Jean Louis; all of whom lived during the latter part of the 18th or the early part of the 19th century, and were renowned for their great skill at fence. The prominent fencing masters of the modern days are Merignac, Prévost and Rouleau of the French school; and Conte and Pini of the Italian school. In the United States Gousky, Senac and Rondelle are perhaps the best known masters. Contests for the amateur fencing champions of America are held annually under the auspices of the Amateur Fencers League of America, which was organized in 1891 and is affiliated with the Amateur Athletic Union.

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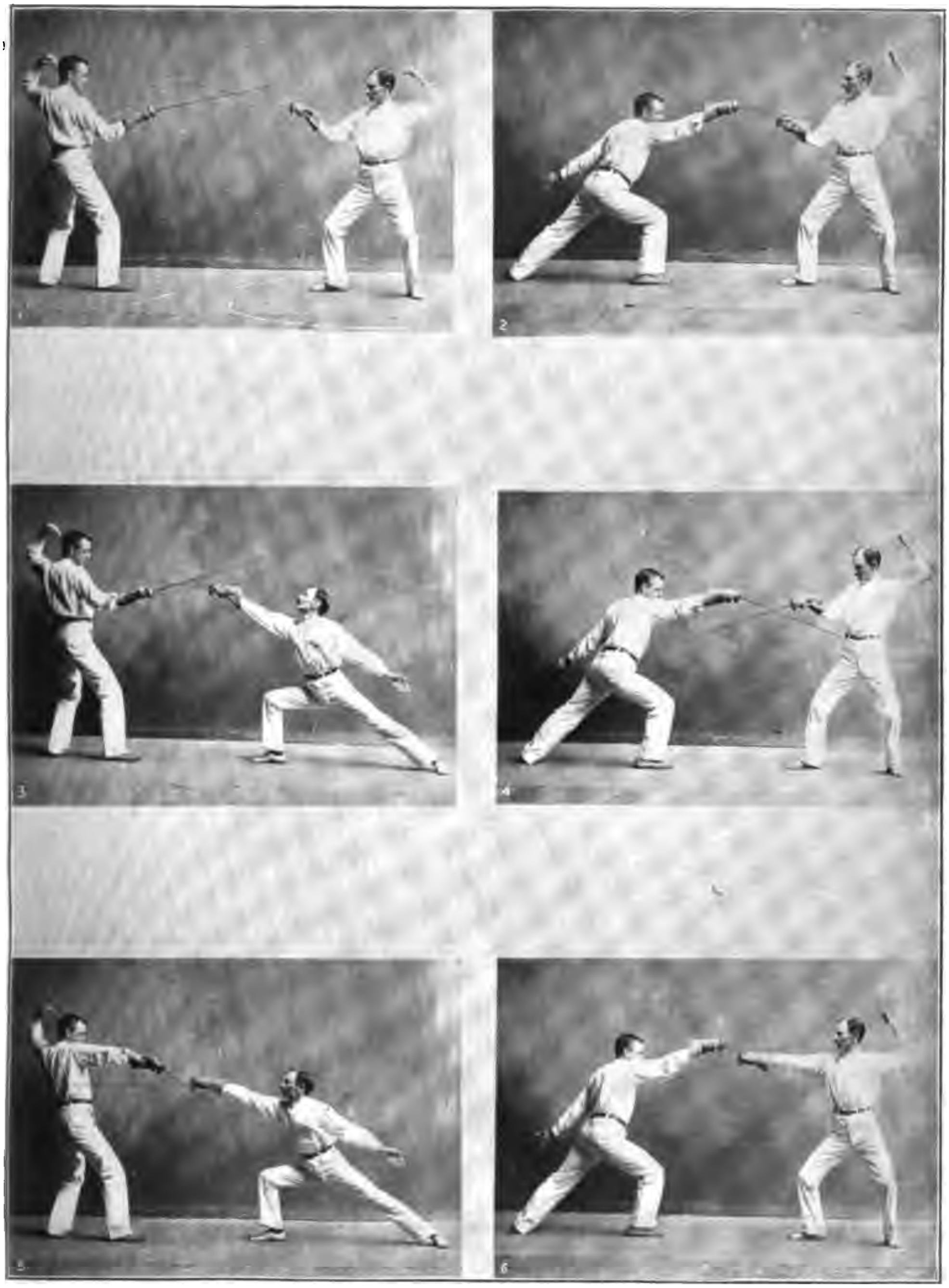

1 On Guard
2 Attack and Parry of Quarte
3 Attack and Parry of Tierce
4 Attack and Parry of Septime
5 Attack and Parry of Seconde
6 A Riposte in Seconde, after a Parry of Tierce

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FENDALL, Josias, colonial governor of Maryland: b. England about 1620. He was appointed governor of Maryland 1656 and received a large landed estate from Lord Baltimore. He was taken prisoner by the Puritans and released in the same year and went to England; returned in 1657; was in 1660 superseded by Calvert and sentenced to banishment and forfeiture, but pardoned; and was heavily fined and banished for sedition 1681.

FENDER, a metal guard placed about an open grate as a safeguard against the dropping of cinders on the floor or rugs. Fenders are usually of iron, steel or brass and some are very artistic in design. The term is applied also to devices for protecting a ship's side from chafing against a dock or from other injury. These devices are of various kinds; some being constructed of rope and canvas, others of cork. Heavy pieces of wood are also used, especially by tugboats; and in the United States navy cotton bales lashed with rope have been used while coaling vessels at sea. At present Spanish cane is largely used.

FÉNELON, François de Salignac de la Mothe, fräṅ-swä dė sä-li-nyäk dė lä mōt fān-lôn, French missionary: b. 1641; d. 1679. He was a half-brother of Archbishop Fénelon (q.v.). He sailed for Quebec in 1667 in response to Bishop Laval's appeal for missionary reinforcements. He was ordained in the following year, and being a Sulpician established a mission to the Cayugas at Quinte Bay. Here he remained till 1673, when the Recollets replaced the Sulpicians on the north shore of Lake Ontario. In 1674 he offended the choleric Frontenac, governor of New France, by a sermon in which a covert attack was made on the governor, was summoned before the council, compelled to leave the country, and on his arrival in France was forbidden to return.

FÉNELON, François de Salignac de la Mothe, French prelate: b. Château de Fénelon, Périgord, France, 6 Aug. 1651; d. Cambray, 7 Jan. 1715. He was educated at Plessis College in Paris and at the seminary of Saint Sulpice, where he received holy orders in 1675. In 1678 he was appointed head of an institution, then newly organized in Paris, for the reception of women converts to the Roman Catholic faith; and the success with which he there discharged his duties led to his appointment in 1686 as head of a mission to Saintonge for the conversion of the Huguenots. In 1689 Louis XIV entrusted to him the education of his grandson, the duke of Burgundy, and to his task he devoted himself with unwearied assiduity. In the result it was held that the duke was brought up on too high ideals, which left him pious but emasculated; and in 1694 he was created archbishop of Cambray. A theological dispute with Bossuet, his former instructor, on the subject of Quietism (q.v.), terminated in the condemnation of Fénelon's side of the controversy by Pope Innocent XII and his banishment to his diocese by Louis XIV. To the Pope's decision Fénelon unreservedly and humbly submitted. The rest of his life was spent in devoted labor in his diocese.

His works on philosophy, theology and the belles-lettres have immortalized his name. He was familiar with the best models of ancient and modern times and his mind was animated by a mild and gentle spirit of benevolence. His style is fluent and pleasing, pure and harmonious. His most celebrated work is 'Les Aventures de Télémaque, in which he endeavored to exhibit a model for the education of a prince. It was carried off and published by a valet employed to transcribe the manuscript. On the appearance of this work Louis manifested displeasure toward Fénelon, conceiving this historical romance to be a satire on his reign and forbade the completion of the printing. Some malicious persons pretended, what Fénelon himself never thought of, that the characters were thin disguises of personages at the court. But there was nothing singular, apart from the suspicion referred to, in the king's displeasure. Fénelon's liberal ideas, as embodied in the book, that the king existed for his subjects and not they for him, were anathema to an absolute monarch. Nor was he ever dazzled by the veneer of splendor and the military glories of the reign. Among his other works are 'Traité de l'Education des Filles'; 'Traité du Ministère des Pasteurs'; 'Explication des Maximes des Saintes'; 'Dialogues on the Eloquence of the Pulpit'; 'Demonstration of the Existence of God'; 'On the Temporal Power of the Mediæval Popes.' (See TÉLÉMAQUE). Consult Ramsay, 'Vie de Fénelon' (1725); Bossuet, 'Histoire de Fénelon' (1808); Gosselin, 'Histoire Littéraire de Fénelon' (1843); Butler, 'Life of Fénelon' (1810); Lamartine (1854); Roy, 'Histoire de Fénelon' (1842); Werfer, 'Leben des Fénelon' (1852); Gandar, 'Fénelon et son Temps' (1864); Lear, 'Fénelon, Archbishop of Cambrai' (1876); Crausle, 'Fénelon et Bossuet' (1895); Sanders, 'Fénelon; His Friends and His Enemies' (1901); Saint Cyres, 'Francois de Fénelon' (1901); Duclas, 'The French Ideal: Pascal Fénelon, and other Essays' (1911).

FENELON FALLS, Canada, township in Victoria County, province of Ontario, 16 miles north of Lindsay. A waterfall 300 feet wide, 21 feet high, is the chief attraction of the place. The river affords facilities for the transportation of lumber, in which the vicinity abounds. Pop. 1,053.

FENESTELLA, Roman historian: b. about 51 B.C.; d. 19 A.D. He took Varro as his model and in his works discussed out-of-the-way incidents, social customs and literary history. He wrote the 'Annales' in 22 books, which chronicled everything down to his own day. It was used by Asconius Pedianus, Pliny the Elder, Gellius and Lactantius, Monius, etc. The fragments which remain show the great variety of subjects treated by the author. The fragments are found in Peter 'Historicorum Romanorum fragmenta' (Leipzig 1883). Consult Mercklin, L., 'De Fenestella Historico et Poeta' (Dorpat 1844); Poeth, J., 'De Fenestella, Historiarum Scriptore' (Bonn 1849); Schanz, M., 'Geschite der röm. Litteratur' (1901); Teuffel, 'History of Roman Literature.'

FENESTRATION (1) *in architecture,* is, in contradistinction to columniation, the system of construction, mode of design and arrangement of windows in a building. (2)*In zoology and anatomy,* the process of being perforated or fenestrated.

FENGHUANG (fūng'hwąng') **CHENG,** Manchuria, a town 45 miles northwest of Antung. It was the scene of a conflict between the Chinese and the Japanese on 13 Dec. 1894 and was occupied by General Kuroki on 6 May 1904. See RUSSO-JAPANESE WAR.

FENIANS, a name said to be derived from Fionn or Finn, an Irish hero of the 2d century, assumed in recent times by those Irish who formed a brotherhood in their own and other countries, which aimed at terminating English rule in Ireland by force of arms and the establishment of an Irish republic. It first took shape when James Stephens, working on plans prepared by a group of Irish revolutionary exiles at Paris in 1848, organized in 1853, by aid of the Phœnix Society the Irish Revolutionary Brotherhood, which was the name assumed in Ireland. He was officially known as chief organizer and had as assistants one representative from each of the four Irish provinces, with officers under them. The movement spread with great rapidity and was linked up with sympathizers of the Irish race all over the world, including the British colonies. The American society was organized concurrently by John D. O'Mahoney as head centre and its purpose was to supply money and arms for a revolutionary outbreak in Ireland. As a secret society the movement fell under the ban of the Catholic Church.

The close of the American Civil War, when large numbers of trained Irish soldiers who had taken part in the war were released from service, was thought to be a convenient time for taking some decisive steps. Two risings were planned in Ireland, but they were both frustrated by the English government, which had received timely information. The first, in September 1865, was prevented by the seizure of the office of the *Irish People,* the Fenian journal published at Dublin, in which papers were found which revealed to the government the secrets of the conspiracy and which led to the capture of a number of suspects. The second, in February 1866, was suppressed after the suspension of the Habeas Corpus Act in Ireland.

An invasion of Canada was attempted in the same year. The advocates of Ireland's independence counted upon aid from the veterans of the Civil War, who were incensed at England's attitude toward the United States during the war. In this they were not disappointed; as among the trained men who were under command of General Sweeney, himself an ex-officer of the United States army, there were many men not of Irish blood or lineage. The troops under General Sweeney are estimated to have been at least 35,000 in number; but so well was the recruiting done that reserve forces who never went to the frontier numbered about 200,000. General Sweeney's men, in May 1866. were stationed at various points on the frontier from Lake Erie to Lake Champlain; at Saint Albans, Vt., under General Spear; at Rouse's Point, N. Y., under General Reilly; at Malone, N. Y. under Col. Michael C. Murphy and around Buffalo, under Gen. John O'Neill. Large quantities of arms and ammution were sent north, a sufficient amount for 50,000 men; but the United States officials hearing of the expected raid, seized the consignment of arms addressed to suspected Fenians and when the troops arrived on the frontier they were powerless because of lack of arms. An attempt was made to regain them, but the officers were arrested by the United States government. General O'Neil invaded Canada by way of Fort Erie and two battles followed, in both of which O'Neill was successful. One known as the «Battle of Ridgeway,» occurred 1 June 1866. Reinforcements not arriving as expected, O'Neill abandoned the place and returned to the American side. He, his staff and men were captured by the United States gunboat *Michigan.* The whole movement was crushed at that time by the United States forces under General Meade, who acted under government instructions in accordance with an arrangement between the United States and England. In February 1867 an attempt to seize arms and ammunition in Chester Castle and convey them to Ireland was frustrated; and on 18 September of that year occurred the release by force of prisoners from a prison van which was conveying Kelly, the Fenian chief, and Deasy, his assistant, to Manchester prison. Later one of the walls of Clerkenwell prison, in which Fenian sympathizers were incarcerated, was blown in. In 1870 and 1871 other and unsuccessful attempts were made to gain a foothold in Canada. Various crimes and attempted crimes against the English government and anti-Home Rule leaders were charged against the Fenians; but they were repudiated and denounced by the Fenians themselves, and all attempts to prove them guilty failed. The Fenian movement was badly led; its chiefs lacked the military skill necessary to accomplish great things; there were dissensions within the ranks and in the United States a good deal of «graft»; the British government was kept well informed as to what was going on. As a military movement it failed; but it impressed on English statesmen the truth that force and repression were no remedies for Irish discontent. It was the blowing in of the wall of Clerkenwell prison that first drew Gladstone's attention to the root cause of Irish disaffection, the ascendency of a Protestant minority in a Catholic country, and drew from him the prompt demand for the disestablishment of the Protestant Episcopal Church in Ireland. Consult for the English point of view, J. Rutherford, 'The Secret History of the Fenian Conspiracy' (2 vols., London 1877); from the Irish standpoint, McCarthy, 'Ireland Since the Union' (London 1877); Savage, 'Fenian Martyrs and Heroes' (Boston 1864); A. M. Sullivan, 'New Ireland' (Philadelphia 1878); also MacDonald, 'Troublous Times in Canada' (Toronto 1910); and the informer Le Caron's narrative, 'Twenty-five Years in the Secret Service' (London 1892).

FENN, George Manville, English novelist: b. Westmininster, 3 Jan. 1831; d. 26 Aug. 1909. His earliest literary ventures were short sketches published in *All the Year Round, Chambers' Journal* and *Once a Week* (of which he became proprietor in 1873). In 1867 he published ‘Hollowdell Grange,’ a story for boys, which was succeeded by over 100 excellent and highly popular tales and novels, many of them boys' stories, and over a thousand short stories and magazine articles. He also produced, either alone or in collaboration, several works for the stage.

FENN, Harry, American artist: b. Richmond, Surrey, England, 14 Sept. 1838; d. 1911. He removed to the United States in 1856 and achieved great success as an illustrator of books. He was one of the founders of the American Water Color Society. Some of his best work is contained in ‘Picturesque America’; ‘Picturesque Europe’; and ‘Picturesque Palestine. His drawings are spirited, of exquisite finish, and reveal delicate qualities of perception and feeling for nature. He was a lecturer on Oriental subjects and received a gold medal at the Chicago World's Fair in 1893.

FENN, William Wallace, American Unitarian clergyman: b. Boston, 12 Feb. 1862. He was graduated at Harvard 1884 and at the Harvard Divinity School 1887, and was ordained to the ministry in 1890. He has had charge ot churches in Pittsfield, Mass. (1887–91), and Chicago (1891–1901). He was lecturer on biblical literature in Meadville Theological School 1892–1901, and in the last-named year was appointed professor of systematic theology in Harvard Divinity School and in 1906 dean of the Faculty of Divinity. He has published ‘Lessons on Luke’ (1890); ‘Lessons on the Acts’ (1894); ‘The Flowering of the Hebrew Religion’ (1894); Lessons on Psalms’ (1900).

FENNEC, a small desert animal (*Canisor Fennecus zerda*) found in the Sahara, which looks like a diminutive fox. It is of a pale creamy yellow color, harmonizing well with its sandy habitat; its breast is white and the tail tipped with black. It is a graceful little animal, about 15 inches long, with a bushy tail about 7 inches in length, and its small face and large erect ears give it an expression of attentive hearkening for unseen foes. It burrows into the sand and can dig so rapidly as to escape pursuers. It is, like most of its kind, nocturnal in habits, searching for water and its food — small birds, mice and insects — after the sun sets, spending the day curled up in its burrow.

FENNEL, a genus of plants, *Fœniculum,* of the Parsley family, consisting of four species of annual or perennial herbs, natives of the Mediterranean region. Common fennel (*F. fœniculum*) is often grown for its aromatic leaves and seeds, which are used for flavoring. Fennel has run wild in some parts of North America, especially in California, where it is said sometimes to reach a height of 12 to 15 feet and become a great pest.

FENNELL, James, Anglo-American actor: b. London, 1766; d. 1816. He received his education at Eton College and at the University of Cambridge. His habits, however, led to his withdrawal from the university and to make a living he was obliged to go on the stage. In 1787, at Edinburgh, he made his début as Othello, a rôle in which he was very successful. He came to the United States in 1793, having received an invitation from Philadelphia. He played in American cities for many years, but his later years were passed in straitened circumstances. Consult his ‘Apology for the Life of James Fennell’ (Philadelphia 1814).

FENTON, Elijah, English poet: b. Shelton, Staffordshire, 20 May 1683; d. August 1730. He studied at Cambridge, but becoming a nonjuror he was obliged to leave the university, after which he accompanied the Earl of Orrery to Flanders as private secretary. Some years later Fenton became associated with Pope, who was then undertaking his version of the ‘Odyssey’ and was in quest of assistants. According to Dr. Johnson, Fenton translated the 1st, 4th, 19th and 20th books of that poem. In 1723 a tragedy, entitled ‘Mariamne,’ which he brought out, had an immense success and gained him nearly £1,000. In 1727 he published a new edition of Milton's works, to which he prefixed a brief and elegant life of the author. This was soon followed by a fine annotated edition of Waller.

FENTON, Reuben Eaton, American statesman: b. Carroll, Chautauqua County, N. Y., 4 July 1819; d. Jamestown, N. Y., 25 Aug. 1885. He was admitted to the bar in 1841, was elected to Congress in 1852 and there opposed the further extension of slavery. From 1857–65 he was again a member of Congress, and he was Governor of New York 1865–68. In 1869–75 he sat in the United States Senate, and in 1878 was chairman of the United States Commission to the International Monetary Conference in Paris.

FENTON, England. See STOKE-UPON-TRENT.

FENUGREEK, the seed of *Trigonella fœnumgræcum,* a plant of eastern Europe and western Asia. It is a member of the clover family and has been used, like clover, for many years as a fodder plant. The seed contains an aromatic essential oil and has been very extensively used as a seasoning. In medicine its use has practically been abandoned, although the seed has unquestionably many excellent properties, its food value alone being considerable. It is still very extensively used in veterinary practice.

FENWICK, George, American colonist: b. England, about 1603; d. 15 March 1657. He came to America in 1636 to take charge of the plantation of Saybrook, so called after Lords Say and Brook, who, with others, in 1632 had procured a patent for the territory from Robert, Earl of Warwick. Returning to England he came back again in 1639, and from that time, as one of the patentees and agent for the others, superintended and governed the settlement of Saybrook till 1644, when he sold its jurisdiction and territory to the Connecticut colony, as his associates had given up their contemplated removal to America. He returned to England in 1645, served in the Cromwellian army and was governor of Berwick in 1648; was appointed one of the judges for the trial of Charles I, but did not act in that capacity. He served in Cromwell's army in Scotland in 1650.

FENWICK, or FENWICKE, John, American colonist: b. England, 1618; d. 1683. He was a Quaker and settled at Salem, N. J., in

1675 with a colony of Quakers. Disputes arose with Governor Andros of New York and Fenwick was arrested and remained two years in prison, being released on parole. His land grants passed to the possession of others during his life and he died in poverty. Consult A. C. Myers (ed.) ‘Narratives of Early Pennsylvania, West New Jersey and Delaware’ (1912).

FENWICK, Sir John, English conspirator: b. England, about 1645: d. 28 Jan. 1697. He became major-general in the army and was a member of Parliament in 1677. He conspired with others against William III and was accused of participation in the Assassination Plot in 1696. A bill of attainder being passed, he was executed for high treason, the last execution in Great Britain in consequence of attainder.

FÉNYES, fā'nyĕsh, **Alexius**, Hungarian statistician: b. Csokály 1807; d. 1876. He received his education at Grosswardein and at Pressburg. He toured Europe and lived in Budapest for a time, collecting data on the geography and statistics of Hungary. After 1835 he lived in Budapest. He became chief of statistics in the Ministry of the Interior in 1848. He wrote a monumental historical and geographical report on Hungary (1839), for which he was awarded a prize by the Learned Society of Hungary. He published also ‘Magyarország Statistikája’ (2d ed., 1844) and an atlas for schools.

FEODOR I, Ivanovitch, ē-vän'ō-vich fā'ō-dōr, Russian tsar: b. 11 May 1557; d. 7 Jan. 1598. He began his reign in 1584, and being weak both in body and mind assigned the government of his affairs to Boris Godunoff, who seems to have managed them with dexterity and vigor. In his reign the peasants of Muscovy were converted into serfs and attached to the land. Previously they had enjoyed personal liberty. The conquest of Siberia was achieved by Godunoff, and many remarkable diplomatic relations with foreign courts were affected.

FEORDOR II, tsar of Russia and eldest brother of Peter the Great: b. 8 June 1656; d. Moscow, 27 April 1682. He ascended the throne when only 19, and evinced a strength of will and determination of character which, had he lived, might have anticipated the reforms which his younger brother subsequently effected. His reign is rendered memorable on account of his calling into his presence the Muscovite nobles, who desolated the country with broils about their claims of family precedence, and throwing the rolls of the Razriad or «Arrangement» into the fire. The genealogical records, which did not relate to claims of precedence, were preserved and properly arranged in accordance with his will.

FEODOSIA, fā-ō-dō'sē-ă (ancient Caffa or Kaffa), Russia, town and watering place on the west angle of a magnificent bay in the southeast of the Crimea, 62 miles east of Simperofol. It is the seat of a cathedral, has an Armenian church dating from 1327, a mosque and a museum of antiquities. It has an excellent harbor; carpets, rugs and soaps are among its manufactures; it is famous for the quality of the grapes grown in the district. The ancient Theodosia, from which the modern Feodosia takes its name, was founded at a very early period by a colony of Greeks from Ionia, and its site was probably not far from its modern namesake. From 1266 to 1474 or 1475 this town was in the possession of the Genoese, except for a short interval when it was held by the Venetians. While in the hands of the Genoese it was the seat of an extensive commerce with the East by way of Astrakhan and the Caspian Sea. From the Genoese it was taken by the Turks, and in 1774 it was taken by the Russians. Pop. 37,961.

FEOFFMENT, in law, a grant or conveyance of a freehold or fee in lands; also, the deed granting a fee in such lands. It was for a considerable period the only method by which freehold land could be alienated in England. It was accompanied originally by a ceremony in which the feoffor gave to the feoffee while both were on the land a twig or a turf, symbolic of the transfer of the property, and declared his intention to deliver possession to the feoffee and stated whether the estate was in fee, in tail, or for life. This was called livery in deed. By another ceremony, the parties being in sight of but not on the land, the feoffor gave possession to the feoffee by indicating the land and instructing him to enter. This was called livery in law. Writing was unnecessary until so made by the English Statute of Frauds, and by a later statute (1845) a feoffment was declared to be void unless evidenced by a deed. In England feoffments have been rendered superfluous by legislation, but in Scotland to-day the old usage is still followed of acceptance by the superior and the performance of necessary services on such acceptance, alienation of a heritage being incomplete in the absence of formal confirmation by the superior.

FER-DE-LANCE, făr-dė-läṅs, the lance-headed or yellow viper (*Lachesis lanceolatus*), a serpent native to northeastern South America, and one of the most terrible members of the rattlesnake family. It is ordinarily six feet in length when full-grown and has no rattle, but the tail ends in a horny spine, which is vibrated rapidly when the snake is excited. It has the general appearance and habits of the rattlesnake (q.v.), attacks without provocation and without warning, feeds upon small mammals, frogs and the like, and was long ago introduced into Martinique, Santa Lucia and a few other of the Antilles as a means of devouring the rats which were a pest to the fields of sugarcane. It flourished and multiplied greatly, producing dozens of young, and has become greatly dreaded by all who work in the fields of those islands. The Indian mongoose was introduced into those islands with the idea of rooting out the fer-de-lance, but he generally leaves him alone, preferring the destruction of poultry. Consult Ditmars, ‘Reptiles of the World’ (1910); Gadow, ‘Amphibia and Reptiles’ (1901).

FERÆ, fē'rē, wild animals; a term adopted by Linnæus for one of his orders of *Mammalia*, embracing a variety of carnivorous animals now scientifically reclassified.

FERÆ NATURÆ, fē'rē nạ-tū'rē («of a wild nature»), the legal name for beasts and birds that are wild or non-domesticated, such as deer, hare, pheasants, partridges, etc., as contradistinguished from those which are *domitæ* *naturæ*, that is, tame animals, such as horses, sheep, etc. The Roman law held such animals as naturally belonging to the first person who should take possession of them, but regarded the right of possession as continuing only as long as the possessor kept them in confinement. As soon as the animal escaped it again became common property, and might be taken possession of by any other person who could capture it, unless the animal had an *animum revertendi*, that is, an intention of returning, which it was to be presumed it had, if it had been trained to return to its master's property, and was in the habit of doing so. This principle has been adopted by both British and American law. When such animals as are classed as *feræ naturæ* make nests or burrows on any person's property and have young, the young are held as belonging to this person as long as they are unable to fly or run away. Those persons who have the right of hunting, taking or killing those wild animals which are included under the designation of game have a qualified property in such animals as long as they continue within their liberty, but no longer. A person who keeps an animal indisputably *feræ naturæ* is responsible for any injury which it may do to the person or property of another. Consult Schouler, 'Treatise on the Law of Personal Property, (1896).

FÉRAUD-GIRAUD, fā'rō'-zhē'rō, **Louis Joseph Delphin,** French jurist: b. Marseilles, 1819. He received his education at the University of Aix and in 1851 was appointed a judge there. He became councillor to the Cours de Cassation in 1878. His published works include 'Servitudes de voirie' (1852); 'Traité de la grande voirie et de la voirie urbaine' (1865); 'Occupation militaire' (1881); 'Code des mines et des mineurs' (1887); 'États et souverains' (1895); 'Traité des voies rurales publiques et privées et servitudes rurales de passage enclaues' (1896).

FERDINAND I (surnamed THE JUST), king of Aragon: b. 1379; d. Igualada, 2 April 1416. He was king of Aragon 1412–16, and was succeeded by his son, Alfonso V.

FERDINAND II, king of Aragon. See FERDINAND V OF CASTILE.

FERDINAND I, emperor of Austria: b. Vienna, 19 April 1793; d. Pesth, 29 June 1875. He was a son of Francis I, suffered from epileptic fits in boyhood and from periods of insanity in later life. He ascended the throne in 1835, continued to pursue the policy of his father, leaving the chief direction of affairs in the reactionary hands of Metternich (q.v.). In his reign the republic of Cracow was annihilated and a portion of it added to the empire. During the revolutionary troubles of 1848 he dismissed Metternich and made several concessions which were found quite inadequate. Vienna revolted in May and the helpless Ferdinand at length retired to Olmütz, and on 2 Dec. 1848, having no children, abdicated in favor of his nephew, Francis Joseph I. Consult Coxe, W., 'House of Austria' (Vol. IV, London 1862); Stiles, 'Austria in 1848–49' (New York 1852).

FERDINAND, duke of Brunswick, German field marshal: b. Wolfenbüttel, 12 Jan. 1721; d. Brunswick, 3 July 1792. Entering the Prussian service in 1740 he rose rapidly and became one of the famous commanders of the age. He held command in western Germany during the Seven Years War, and among his victories were those of Crefeld (1758) and Minden (1759). He was noted for his patronage of science and art as well as for his many benevolences.

FERDINAND I, king of Bulgaria: b. Vienna, 26 Feb. 1861. He is the youngest son of the late Prince Augustus of Saxe-Coburg and Princess Clémentine of Bourbon-Orléans, a daughter of Louis Philippe. He received an excellent education and showed a marked aptitude for the study of natural history. The results of his botanical observations on a trip which he made to Brazil in 1879 were published at Vienna (1883–88). While serving in the Austrian army he was offered in 1886 the vacant throne of Bulgaria, and on 14 Aug. 1887 took the oath to the constitution and the title of prince. Although thoroughly acceptable to his subjects, he was not recognized by Turkey or the great powers until 1896. In 1893 he married Marie Louise of Bourbon, eldest daughter of Duke Robert of Parma, and the next year the Bulgarian Sobranje confirmed the title of Royal Highness to the prince and his heir. Ferdinand has continued to adhere to the Roman Catholic faith, the constitution making an exception in his case only. In 1908 Prince Ferdinand took as second wife, Eleanor, a princess of the house of Reuss, and in the same year, taking account of the increased prosperity of his country and the difficulties, foreign and domestic, which beset Turkey, he proclaimed the full independence of Bulgaria and assumed the title of king (tsar). His royal title was recognized by Turkey and the Powers in 1909. Ferdinand favored the formation of the Balkan League and the prosecution of the Balkan War of 1912–13. In the first period of that struggle the prowess of Bulgarian arms was such as to enhance the king's prestige, but the lamentable quarrel of Bulgaria with her former allies and the pitiable collapse of his country in the Second Balkan War discredited Ferdinand, both at home and abroad. Although by the final settlements of 1913 his kingdom had been materially enlarged by the incorporation of part of Thrace, including some 60 miles of seacoast on the Ægean, Ferdinand was deeply chagrined that a relatively larger territory had not been secured, and he even considered abdication. On 13 Oct. 1915 Bulgaria joined the Central empires against the Entente Allies and invaded Serbia, which, with the aid of the Austro-German armies, it reduced. In July 1916 Rumania entered the war and Russia was enabled to send armies through Rumania to attack the Bulgarian armies, which were menaced also by the Anglo-French forces operating north from Salonica. After the surrender of Bulgaria to the Allies at the end of September 1918, Tsar Ferdinand abdicated on 3 October in favor of his son, Prince Boris, and left Bulgaria the following day. The first decree signed by the new monarch was one demobilizing the Bulgarian army.

FERDINAND I, German emperor: b. Alcalá, Spain, 10 March 1503; d. Vienna, 25 July 1564. He was a brother of Charles V, after whose abdication in 1556 he took the title of emperor of Germany, although his claim to the title was not recognized by the electors till 1558. In 1526 or 1527 he became king both of Hungary 'and Bohemia, which he claimed in right of his wife, sister of Louis II of these kingdoms, and after that period they remained attached to the empire. Ferdinand had been chosen king of the Romans in 1531. In 1559 he held a diet at Augsburg, in which the currency of the empire was regulated, and many religious grievances suffered by the Protestants were exposed. Ferdinand was of a mild and tolerant character, attempted the reconciliation of Catholics and Protestants, and in 1562 urged on the Council of Trent religious reforms.

FERDINAND II, German emperor: b. Gratz, Styria, 9 July 1578; d. Vienna, 15 Feb. 1637. He succeeded to the throne of Bohemia in 1617, to that of Hungary in 1618, and succeeded his uncle Matthias as emperor of Germany in 1619. His zeal was excited against every deviation from the decrees of the Council of Trent, and he firmly adhered to an anti-Protestant policy. The Bohemians, jealous of the privileges which they had secured from Rudolph, and of which they saw that Ferdinand was disposed to deprive them, declared that he had forfeited the Bohemian crown, which they offered to the Elector Palatine Frederick V, a step which lead to the outbreak of the Thirty Years' war. The support of the Catholic League, and of the Elector of Saxony, John George I, placed him firmly on the throne of Bohemia, where he vigorously pursued the Protestants, whose opposition to him was as much political as religious. His dismissal of Wallenstein and connivance at his assassination are blots on his character, and his plans for the effecting of a counter-Reformation were effectually checkmated by Gustavus Adolphus.

FERDINAND III, German emperor, son of Ferdinand II: b. in Gratz, Styria, 11 (or 13) July 1608; d. Vienna, 2 April 1657. He was made king of Hungary in 1625, of Bohemia in 1627, and succeeded his father in 1637. In 1648 he signed the Peace of Westphalia, which interdicted religious persecution in Germany.

FERDINAND I, king of Naples, illegitimate son of Alfonso I: b. about 1423; d. 25 Jan. 1494. He succeeded his father in 1458. His false and cruel character provoked a civil war, in which John of Anjou took part with the barons, and the king was aided by the Pope Pius II, Sforza, Duke of Milan, and by Scanderberg. The king defeated his rival in 1462, and make peace; but breaking his word war broke out again. Again the king won, and established order by terror.

FERDINAND II, king of Naples, son of Alfonso II: b. 26 July 1469; d. 7 Oct. 1496. He succeeded his father when the latter abdicated in 1495.

FERDINAND III, king of Naples. See Ferdinand V of Castile.

FERDINAND IV, king of Naples, and I, of the Two Sicilies: b. Naples, 12 Jan. 1751; d. there, 4 Jan. 1825. He ascended the throne in 1759, and after the death of Louis XVI he joined the coalition engaged in the general war against France (1793–96). The victory gained at Aboukir by Nelson again brought Ferdinand into a hostile attitude against the French; in 1798 his troops occupied Rome, but fled panic stricken on their approach, and he was driven from his kingdom in 1799. In the same year, however, his troops regained possession of the capital. In 1806 Ferdinand was again forced to abandon Naples, the crown of which Napoleon I conferred first on his brother Joseph Bonaparte, and afterward on his brother-in-law, Murat (q.v.), Ferdinand, however, continuing to reign in Sicily under English protection. In 1814 the Congress of Vienna finally established Ferdinand as king of the Two Sicilies. Revolutionary movements, set afloat by the Carbonari (q.v.), compelled the establishment of a constitution, against the advice and interests of Austria, Russia and Prussia; the first named power marched an army across the Po, defeated the Neapolitan army, and occupied Naples. Ferdinand who, having refused to sanction the liberal declarations of his subjects, had quitted his capital, was then re-established, and ruled thenceforward with absolute power.

FERDINAND, titular king of Portugal: b. Vienna, 29 Oct. 1816; d. Lisbon, 15 Dec. 1885. He was a son of the Duke of Saxe-Coburg-Gotha, and married Maria de Gloria, queen of Portugal, in 1836. The title of king consort was granted him in 1837, and after the queen's death, in 1853, he was regent till 1855, during the minority of his son Pedro. In 1869 he was offered the crown of Spain. In that year he married an American singer, Eliza Hensler, whom he made Countess of Edla. He possessed not a little skill as artist and engraver and was an ardent book collector, especially of books and pamphlets forbidden by the government or police of European countries.

FERDINAND II, king of the Two Sicilies: («King Bomba»): b. Palermo, 10 Jan. 1810; d. Naples, 22 May 1859. He succeeded his father, Francis I, 8 Nov. 1830. The new sovereign at first made some concessions to his subjects. He married Maria Theresa, daughter of the Archduke Charles of Austria, an alliance of sinister omen to liberal measures. He pursued a reactionary policy, giving his subjects to understand that his will was to be their only law and that the least opposition to it would be followed by banishment or incarceration in a dungeon. This was no empty threat. Devoting much time to hunting, he left the government to be administered by favorites and reserved his interference chiefly for occasions requiring the exercise of that mixture of obstinacy and energy which formed the leading feature in his character. After a succession of partial outbreaks, the revolutionary year of 1848 brought matters to a crisis, during which Ferdinand II earned the nickname of «King Bomba,» by bombarding Messina from the forts commanding it. At the commencement of the insurrection, which first broke out at Palermo and threatened to extend over both divisions of the kingdom, Ferdinand issued a decree promising a constitution, but after the Austrian victory at Novara, when he had by main force re-established his ascendency, retracted all his promises and established one of the vilest despotisms which has disgraced modern times. William Ewart Gladstone, who personally visited the Neapolitan prisons, denounced his rule as the «negation of God,» a judgment that was endorsed by Lord Palmerston. It was estimated at that time that there were 15,000 persons in prison accused of political offenses and this number is believed to be greatly underestimated. Great Britain and France endeavored, by friendly remonstrance, to check him, and being only rebuked for presuming to interfere, testified their displeasure by withdrawing their ministers from Naples. This measure seems only to have made Bomba more resolute than ever to rule in his own way. He died leaving his dungeons crowded with the best and bravest of his subjects and his kingdom in a state approaching dissolution. Consult Dawburn, 'Naples and King Ferdinand' (1858); and Gladstone, 'Two Letters to Lord Aberdeen on the Neapolitan Prisons' (1851).

FERDINAND I (surnamed The Great), king of Castile and Leon: b. about 1000; d. Leon, Spain, 2 Dec. 1065. He was the son of Sancho II, king of Navarre, and by the death of Bermudo, 1037; he became king of Leon. He then made war against the Moors, from whom he took Toledo, Saragossa and Seville and pushed his conquests as far as Portugal. He next declared war against his brother, Garcias IV, king of Navarre, in which that prince lost his life, a large part of his kingdom being subsequently annexed (1054).

FERDINAND II, king of Leon: d. 1188. He was the son of Alphonso VII and in a war with Portugal made the king, Alphonso Henriquez, prisoner. In the reign of this prince the military order of Saint James was instituted, 1177, for the purpose of defending the dominions of the Christian powers against the Saracens.

FERDINAND III (surnamed The Saint), king of Castile and Leon: b. about 1200; d. Seville, Spain, 30 May 1252. He was the son of Alphonso IX and obtained the crown of Castile by the abdication of his mother, Berengaria, in 1217, and that of Leon by the death of his father in 1231. He took Cordova, Jaen and Seville from the Moors and reduced their holding in Spain to Granada, codified the laws of Christian Spain, persecuted the Albigensian heretics, is regarded as the founder of the University of Salamanca and was canonized by Pope Clement X.

FERDINAND IV, king of Castile and Leon (The Summoned): b. Seville, 1285; d. 1312. He succeeded to the throne of Castile in 1295, at the death of his father, Sancho IV. He received his singular nickname from the traditional report that two brothers of the name of Caravajel, whom he had cruelly and unjustly put to death, summoned him to appear within 30 days to answer for his crime at the judgment seat of God.

FERDINAND V (surnamed The Catholic), king of Spain, II of Aragon, V of Castile: b. Sos, Aragon, 19 March 1452; d. Madrigalejo, Spain, 23 Jan. 1516. On 18 Oct. 1469 he married Isabella of Castile (q.v.) and thus brought about a close connection between Aragon and Castile, although both kingdoms continued to be governed separately, for Isabella allowed her husband no other share in the government of Castile than the privilege of affixing his signature to the decrees and of uniting his arms with her own. He had none of the attractive qualities of his wife; but with Cardinal Ximenes they raised Spain to an eminence which she had never before attained. After a fierce war of 10 years they conquered Granada (1491); the only kingdom of which the Moors yet retained possession in Spain; but the most brilliant event of their reign was the discovery of America, for which Isabella had furnished the ships and which made them sovereigns of a new world. (See Columbus). This politic prince laid the foundation of the Spanish ascendency in Europe by the acquisition of Naples (1503), by means of his general, Gonsalvo of Cordova, and by the conquest of Navarre (1512); but he was lacking in generosity, faithless to his covenants and unscrupulous. These stains obscure the great qualities which made him, next to his consort, the first monarch of his time. It was during his reign that the banditti were suppressed and the heritable jurisdiction of the nobles suppressed. The king himself assumed the grand mastership of the military orders of Calatrava, Alcantara and Santiago. He founded universities; and established in 1480 the court of the Spanish Inquisition. In 1492 he expelled the Jews from the kingdom — a measure that was ultimately followed by disastrous consequences — and in 1501 gave the Moors the alternative of baptism or banishment. Two years after the death of his wife, Isabella, which took place in 1504, he married Germaine de Foix. Consult Prescott, 'Ferdinand and Isabella' (1837).

FERDINAND VI (The Sage), king of Spain: b. 23 Sept. 1712; d. Villaviciosa, 10 Aug. 1759. He was the son of Philip V, and ascended the throne in 1746. Under the tutelage of his consort, Barbara of Braganza, he relinquished a policy of foreign entanglements in which his country had nothing to gain, promoted its internal welfare, reorganized the navy, encouraged manufactures and by his judicious political conduct placed his elder brother on the throne of Naples, and another under the ducal canopy of Parma.

FERDINAND VII, king of Spain: b. San Ildefonso, 13 Oct. 1784; d. Madrid, 29 Sept. 1833. He was the eldest son of Charles IV. From the earliest years he manifested a strong dislike to the favorite Godoy, who ruled both the king and queen; and in 1807 was arrested as a conspirator. After the popular rising at Aranjuez, in March 1808, his father was forced to abdicate in his favor — an act which he presently repudiated. A month later, having been induced to meet Napoleon at Bayonne, he himself abdicated in turn, placing the crown at the disposal of Napoleon, who at once gave it to his brother Joseph. Ferdinand was kept a prisoner at Valençay till 1813, when Napoleon offered to re-establish him on his throne. He returned to Spain in March 1814, having previously promised to maintain the constitution of 1812. In spite of his promise he annulled this constitution and dissolved the Cortes two months after his return. In consequence of this and of his arbitrary rule a military insurrection broke out 1 Jan. 1820. The rebels were at first successful and Ferdinand was obliged to swear to the constitution of 1812; but having received support from Louis XVIII of France, who sent an army to his aid in 1823, he was ultimately enabled to suppress the insurrection and to make his authority once more absolute in Spain. Ferdinand was under control of the clericals, and proved himself cruel, ungrateful and unscrupulous. Ferdinand was married four times, but only left one daughter, Isabella, by his fourth wife, Maria Christina of Naples. By a decree issued 29 March 1830, called the Pragmatic Sanction, he abolished the act of 1713, by which Philip V had excluded women from the throne of Spain. He then left his crown to his daughter, Isabella, to the exclusion of his brother, Don Carlos. It was during the reign of this king that the Spanish colonies in South America broke away from the mother country.

FERDINAND III, Joseph John Baptist, grand duke of Tuscany and archduke of Austria: b. 6 May 1769; d. Florence, Italy, 18 June 1824. He succeeded his father, the Emperor Leopold II, as grand duke of Tuscany, in 1790. He was the first sovereign to acknowledge the French Republic, and although compelled to join the first coalition against it, took the first opportunity of withdrawing. In spite of this he was, in 1799, at the time of the second coalition, deprived of his dominions, which, at the Peace of Lunéville, in 1801, were given to the Prince of Parma. He afterward received as compensation the duchy of Salzburg, in Germany, with the title of elector. In 1805 he exchanged Salzburg for the grand duchy of Würzburg; in 1806 he joined the Confederation of the Rhine, and till 1813 remained a faithful ally of Napoleon. By the first Peace of Paris (30 May 1814) he recovered his hereditary dominions. He was an enlightened and clement ruler, who encouraged commerce and was a liberal patron of art and science. Consult Inghirami, 'Storia della Toscana' (1843); Thayer, 'Dawn of Italian Independence' (1893); Tivaroni, 'Italia Durante il Dominio Austriaco' (1892–94).

FERDINAND IV, grand duke of Tuscany: b. 10 June 1835; d. 17 Jan. 1908. He was a son of Leopold II, whom he succeeded in 1859. After his father's abdication (21 July 1859) he issued a formal protest; in 1860 his country was incorporated with the kingdom of Sardinia and subsequently with the kingdom of Italy, and he withdrew to Salzburg.

FERDINAND, Victor Albert Meinrad, king of Rumania: b. Sigmaringen, Prussia, 24 Aug. 1865. He is the second son of Prince Leopold of Hohenzollern and nephew of the late Charles I of Rumania, and was declared heir presumptive to the Rumanian crown in November 1888. In the following March he was granted the title of Prince of Rumania and declared successor to the crown. He married Maria, eldest daughter of the Duke of Saxe-Coburg and Gotha, in January 1893. He succeeded to the throne as Ferdinand I on 11 Oct. 1914.

FERDINAND, a noted figure in Shakespeare's 'Tempest.' He is the son of the king of Naples, and after being shipwrecked through the magic of Prospero, on the latter's enchanted island, falls in love with Prospero's daughter, Miranda.

FERDINAND ALBERT II, duke of Brunswick: b. 1680; d. 1735. He fought with the Imperial armies in the war of the Spanish Succession and was appointed lieutenant-general in 1711. In the Turkish wars he fought with Prince Eugène. In 1733 he was field marshal of the empire and two years later became duke of Brunswick-Wolfenbüttel. He was grandfather of Ivan VI, Tsar of Russia and father-in-law of Frederick the Great.

FERDINAND OF PORTUGAL, known as "The Saintly Prince": b. 1402; d. 1443. He was the sixth son of John I, and took part in the Tangier expedition with Henry, his brother, in 1437. When the Portuguese forces were repulsed Henry left Ferdinand as a hostage with the Sultan of Fez and promised the city of Ceuta as ransom. The king and parliament refused to give the city to the sultan and Ferdinand remained a prisoner for six years. His body was at length brought to Lisbon for interment. Ferdinand was beatified in 1470.

FERENTINO, fā-ren-tē'nō (ancient FERENTINUM), Italy, city in the province of Rome, 50 miles southeast of the city of Rome. The city stands at an elevation of 1,450 feet. It belonged to the Volsci, under whom it rose to be a place of considerable importance, and it still exhibits the remains of ancient walls, built of hewn stone without mortar. The cathedral occupies the site of an ancient necropolis. Pop. of commune 12,928.

FERENTO, fā'rĕn-tō, Italy, a ruined city five miles north of Viterbo, near the ancient Ferentinum, a city of the Etruscans. There are the remains of Roman walls, baths and a theatre. Consult Dennis, G., 'Cities and Cemeteries of Etruria' (London 1883).

FERETORY, fĕr'e-tō-ri, the bier or shrine containing the relics of saints borne in processions, which was usually done upon their feast days, as a token of gratitude in times of public rejoicing, or to obtain some favor in seasons of calamity. The type of a feretory is a coffin, but the form is usually that of a ridged chest, with a roof-like top. It was made of precious metals, wood or ivory. Also, a small room or chapel attached to an abbey or church, in which shrines were deposited.

FERGHANAH, or **FERGANAH,** fĕr-gä'nä, a province, since 1876, of Russian West Turkestan, central Asia, formerly the khanate of Kokand, lying among the western ranges of the Tian-Shan Mountains; area, 55,483 square miles, four-fifths of which are mountainous, the Tchotkal Mountains being in the north, and the Ala-tau and the Trans-Alatau chain in the south. The climate is warm, but deficient in rainfall. The rest of the province consists of the fertile irrigated plain of the Sir-Daria (Jaxartes), which traverses Ferghanah from northeast to southwest. About 1,000,000 acres are in forests. There is great and as yet undeveloped mineral wealth. Two railways traverse part of the province: the Transcaucasian and the Orenburg-Tashkent. The province was annexed to Russia in 1876. The chief towns are Kokand, capital (pop. 112,000), Margelan, Namangan and Andidjan. Pop. estimated 2,134,000 predominantly Mohammedan in religion, consisting mainly of Sarts and Usbegs.

FERGUS (fur'gus) **FALLS,** Minn., city and county-seat of Otter Tail County, on the Red River, the Northern Pacific and the Great Northern railways. It is in the heart of the "park" section of the State, being surrounded by prairie land and forests of pine and hardwood and the Park Region. It contains the Norwegian Lutheran College, high school, public library, State Hospital for the Insane, waterworks, electric lights, several banks and newspapers. The manufactures are flour, lumber, wagons, sleighs, woolen goods, furniture, brooms, etc. Fergus Falls, chartered as a city in 1883, is governed under the charter of that date, which provides for a mayor, elected annually, and a city council. Pop. 6,887.

FERGUSON, Donald, Canadian legislator: b. Marshfield, Prince Edward Island, 1839. He received his education in the public schools and entered journalism. He was elected to the provincial legislature as a Conservative in 1878 and was re-elected until 1891. He served also as Minister of Public Works and as Provincial Secretary and Commissioner of Crown Lands. He became Dominion senator in 1893 and in 1894 became a member of Bowell's Cabinet and later in that of Sir Charles Tupper.

FERGUSON, Elsie (Louise), American actress: b. New York, 19 Aug. 1885. She was educated at the Normal College, New York, made her début in 'The Liberty Belles' at the Madison Square Theatre, New York, in 1901 and made her first London appearance as Ella Seaford in 'The Earl of Pawtucket' at the Playhouse in 1907. She toured the United States in 'Pierre of the Plains,' 'The Battle,' 'The Traveling Salesman' (1908), later starred in 'Such a Little Queen,' in 'Dolly Madison' and 'The Strange Woman, 'The Unseen Empire.'

FERGUSON, James, Scottish physicist: b. Keith, Banffshire, 25 April 1710; d. London, 16 Nov. 1776. As soon as his age would permit he was employed by a farmer to tend his sheep, in which situation he acquired a knowledge of the stars and constructed a celestial globe. This extraordinary ingenuity becoming known he was enabled to obtain instruction in mathematics and drawing, in which latter art his improvement was so rapid that he drew portraits in miniature, commencing in Edinburgh in 1734, by which employment he supported himself for over 20 years. In 1743 he went to London, where he published astronomical tables and lectures and lectured on experimental philosophy illustrated by aid of ingenious machines and diagrams of his own. In 1763 he was chosen a Fellow of the Royal Society, without the usual fees. His chief works are 'Astronomy Explained on Sir Isaac Newton's Principles' (1756 — many editions); 'Lectures on Select Subjects in Mechanics, Hydrostatics, Pneumatics and Optics' (1760); 'Analysis of a Course of Lectures on Mechanics, Pneumatics, etc.' (1763); 'Young Gentleman's and Lady's Astronomy' (1768); 'Introduction to Electricity' (1770); 'Select Mechanical Exercises' (1773); 'The Art of Drawing in Perspective' (1775). Most of his works were very popular. Consult the 'Life' by Henderson (1867).

FERGUSON, James, American astronomer and civil engineer: b. Perthshire, Scotland, 31 Aug. 1797; d. 26 Sept. 1867. In his infancy he was brought to New York (1800), and on reaching manhood worked as an assistant engineer in the excavation of the Erie Canal (1817–19). The three following years he was employed as assistant surveyor to the boundary commission appointed to carry out the provisions of the Treaty of Ghent. From 1822 to 1827 he was astronomical surveyor on the same work. The pursuit of practical astronomy occupied his later life, and as assistant astronomer of the United States Naval Observatory, he discovered several asteroids and was a frequent contributor to scientific magazines.

FERGUSON, James Edward, American public official: b. Bell County, Tex., 31 Aug. 1871. He was educated in the district school, spent two years on the Pacific Coast and in the Rocky Mountain region as laborer, miner, teamster, etc. He became foreman of bridge-building crews on various railways in Texas, engaged in farming in Bell County and is now an extensive landowner there. He was admitted to the Texas bar in 1897, practised in Belton, and later in Temple, Tex. In 1907 he was one of the organizers of the Temple State Bank. Although almost unknown outside the confines of his native county, he announced himself as candidate for governor of Texas on a business man's platform in 1914; was nominated at the primaries and elected governor for the term 1915–16.

FERGUSON, John Calvin, American in the Chinese service: b. Ontario, 1 March 1866. He was graduated at Boston University in 1886. From 1888 to 1897 he was president of Nanking University and from 1897 to 1902 of Nanyang College, Shanghai. He became secretary of the Chinese Ministry of Commerce and from 1903 to 1907 was chief secretary of the Imperial Chinese Railway Administration. He also served as foreign adviser to the viceroys of Nanking from 1898 to 1911 and of Wuchang from 1900 to 1910. In 1911 he was foreign secretary to the Ministry of Posts and Communications, but resigned to devote himself to literary and art studies. Since 1915 he has served as counsellor of the Chinese Department of State. He was a member of the Chinese commission to revise treaties with the United States and Japan in 1902–03, and was sent on special missions for the Chinese government to the United States in 1901, 1904, 1907, also to the ninth convention of Red Cross societies at Washington in 1912. He has received many honors and decorations from the Chinese and other governments. From 1907 to 1911 he was proprietor of the Shanghai *Times*.

FERGUSON, Louis Aloysius, American electrical engineer: b. Dorchester, Mass., 19 Aug. 1867. In 1888 he was graduated at the Massachusetts Institute of Technology and in the same year joined the staff of the Chicago Edison Company as engineer of the underground department. He was promoted assistant electrical engineer of the construction department in 1889, electrical engineer of the company in 1890 and general superintendent from 1897 to 1902. He was also general superintendent of the Commonwealth Electric Company from 1898 to 1902 and second vice-president of both corporations in 1902. He has done much notable work in central station practice. In 1895 he was appointed on the staff of lecturers of the University of Wisconsin. He is a member of the American Institute of Electrical Engineers, and served a term as president in 1908–09.

FERGUSON, Margaret Clay, American botanist: b. Phelps, N. Y., 20 Aug. 1863. She began her career as a teacher in the public schools in 1886–88 and in 1892–93 was in charge of the department of science at Harcourt Place Seminary, Gambier, Ohio. In 1894–96 and in 1902–04 she was associate professor and head of the department of botany and after 1906 professor of botany at Wellesley College. She is a graduate of Cornell University. In 1901–02 she was assistant in botany at the Cornell Summer School and instructor there in 1903. She is the author of scientific papers dealing with problems in plant physiology and embryology.

FERGUSON, Patrick, British soldier and inventor of the first breech-loading rifle used in the British army: b. Pitfour, Scotland, 1744; d. King's Mountain, S. C., 7 Oct. 1780. At the age of 15 he became a cornet in the Scots Greys and afterward served in Germany and Tobago. The skill of American marksmen shown at the beginning of the War of Independence directed his attention to the improvement of the rifle; in 1776 he patented a breech-loading rifle, firing seven shots a minute and sighted for ranges from 100 to 500 yards; and with it he armed a corps of Loyalists, who helped at the battle of Brandywine (1777) to defeat the American army. He himself had a chance there of picking off an officer, but «let him alone, disgusted with the idea of firing at the back of an unoffending individual, who was acquitting himself very coolly of his duty.» Next day he learned that the officer was Washington. Three years later, Ferguson fell, defending King's Mountain, S. C., with 800 militia, against 1,300 Americans.

FERGUSON, Robert (surnamed THE PLOTTER), Scottish conspirator: b. near Alford, Aberdeenshire, about 1637; d. 1714. He went to England about 1655 and in 1662 under the Act of Uniformity was ousted as a Presbyterian from the Kentish vicarage of Godmersham. He played for 10 years a leading part in every treasonable scheme against the last two Stuart kings. He was a vigorous pamphleteer, in one of which he sought to prove the legitimacy of Monmouth. He acted as chaplain and secretary to Monmouth during his rebellion and after the battle of Sedgmoor fled to Holland. He also accompanied the expedition of William of Orange that set him on the throne. But after the Revolution he changed sides and while holding a post under William conspired as busily for the losing Jacobite cause, and was more than once in prison but not brought to trial. He wrote 'History of the Revolution' (1706); 'Qualifications Requisite in a Minister of State' (1710), etc. Consult Ferguson, James, 'Ferguson the Plotter' (1887); ib., 'Two Scottish Soldiers' (1888).

FERGUSON, SIR Samuel, Irish poet: b. Belfast, Ireland, 10 March 1810; d. Howth, Ireland, 9 Aug. 1886. In early life he was a prominent member of the Irish bar; in 1867 was appointed deputy keeper of the public records of Ireland; and in 1878 was knighted in recognition of his antiquarian and literary accomplishments. He will best be remembered as the author of the stirring poem 'The Forging of the Anchor,' which first appeared in *Blackwood's Magazine*. Chief among his other publications are 'Lays of the Western Gael' (1865); 'Congal' (1872), a poem in five books; and 'Poems' (1880). His most important antiquarian work is 'Ogham Inscriptions in Ireland, Wales and Scotland,' published posthumously in 1887.

FERGUSON, Samuel David, American negro bishop: b. Charleston, S. C., 1 Jan. 1842. In 1848 he emigrated with his parents to Liberia, Africa, was educated in the mission schools there, was made teacher in 1862, ordained deacon 1865 and priest of the Protestant Episcopal Church in 1868. He was elected missionary bishop of Cape Palmas and parts adjacent by the House of Bishops assembled in New York in 1884 and was consecrated in Grace Church of that city, 24 June 1885. He is the first African to be raised to the episcopate of the Protestant Episcopal Church of America.

FERGUSSON, Arthur Walsh, American linguist: b. Benicia, Solano County, Cal., 4 Dec. 1859; d. Manila, P. I., 29 Jan. 1908. He was graduated at Saint Augustine College, Benicia, in 1877, and at the Georgetown University Law School in 1885. In 1889 he became official interpreter of the American conference at Washington. Subsequently he was secretary of the International American Monetary Commission in 1891; official interpreter of the Intercontinental Railroad Commission in the same year; secretary of the United States Chilean Claims Commission in 1893; secretary of the United States and Venezuelan Claims Commission in 1894; chief translator of the Bureau of American Republics in 1897; official interpreter of the American and Spanish Peace Commission at Paris in 1898; and Spanish secretary of the United States Philippine Commission in 1900.

FERGUSSON, James, Scottish writer on architecture and archæological subjects: b. Ayr, Scotland, 22 Jan. 1808; d. London, 9 Jan. 1886. He went to India as partner of an important commercial house, started an indigo factory on his own account and after some years retired from business to devote himself to the study of architecture and early civilizations. In 1845 he published 'Illustrations of the Rock-cut Temples of India'; in 1849 'A Historical Enquiry Into the True Principles of Beauty in Art'; in 1851 'The Palaces of Nineveh and Persepolis Restored'; in 1855 'Illustrated Hand-book of Architecture'; in 1862 'History of the Modern Styles of Architecture,' a sequel to the handbook, both being afterward combined in his 'History of Architecture in All Countries, from the Earliest Times to the Present Day' (1865–67), and completed by a 'History of Indian and Eastern Architecture' (1876). He also wrote 'Fire and Serpent Worship'; 'Rude Stone Monuments in All Countries.' He ranks among the foremost writers upon architecture.

FERGUSSON, Robert, Scottish poet: b. Edinburgh, 17 Oct. 1750; d. 16 Oct. 1774. He became clerk in a law office and wrote poems both in pure English and in the Scottish dialect, the latter being much superior to the former. His best productions display a rich fund of natural humor, keen powers of observation and an excellent command of language. He was buried in the Canongate churchyard, Edinburgh, where Burns erected a monument to the memory of this kindred genius. His 'Poems' first appeared in 1773 and have been often reprinted.

FERGUSSON, Sir William, English surgeon: b. Prestonpans, Scotland, 20 March 1808; d. London, 10 Feb. 1877; and educated at Edinburgh University. Sir William was one of the leading consulting surgeons in Europe, the author of 'A System of Practical Surgery' (1842); and the inventor of numerous surgical instruments embodying ingenious improvements. He was created a baronet in 1866, "in consideration of distinguished merit and eminence as a surgeon."

FERIÆ, fē'ri-ē, in ancient Rome, public holidays, during which all labor ceased, and all judicial and political proceedings were suspended. The feriæ were divided into two classes, general holidays and private holidays, observed by certain families or individuals. On these days the temples were visited, and prayers and sacrifices offered.

FERINGHEE, or **FERINGEE,** fe-ring'gē, the name given by the Hindus to the English and other Europeans. The word is intended to be disrespectful rather than complimentary.

FERINO, Pierre Marie Barthélemy, pē-ār mā-rē bar-tāl-mē fā-rē'-nō, Count of, French general: b. Caravaggio, Lombardy, 1747; d. Paris, 28 June 1816. Having entered the Austrian army, he served in the Seven Years' war, but being unjustly treated by the Austrian government, went to France in 1789, and rose to prominence in the French army. The courage which he displayed at the defense of the bridge of Huningen procured for him the rank of grand-officer of the Legion of Honor (1804), as well as the title of senator. In 1808 he was made a count. Having voted for the deposition of Napoleon, Ferino received from Louis XVIII the cross of Saint Louis, as well as letters of naturalization which in consequence of the separation of Lombardy from France had become necessary in order to entitle him to sit in the new Chamber of Peers. The name of this general is written on the east side of the triumphal *Arc de l'étoile.*

FERLAND, fėr-lŏṅ', **Jean Baptiste Antoine,** Canadian historian: b. Montreal 1805; d. Quebec 1865. He was educated at Nicolet and entered the priesthood, becoming a professor in his old college, and in 1850 a member of the archiepiscopal staff at Quebec. His later years were devoted to historical research. He was the author, among other works, of 'Cours d'Histoire du Canada.'

FERLAND, Joseph Auge-Albert, Canadian poet and artist: b. Montreal 1872. He studied art, literature and theology in his native city. He has executed several historical portraits of a high order but is more generally known from his poetical works. He was a frequent contributor to *Les Soirées du Château de Ramesay* and was one of the founders of L'Ecole Littéraire de Montreal. He was chosen corresponding member of the French Academy of Literature and Biography in 1903. His principal works are 'Mélodies poétiques' (1893) and 'Femmes rêvées' (1899). Consult article 'French-Canadian Literature' (in 'Canada and its Provinces,' Vol. VI, Toronto 1914).

FERMANAGH, fėr-man'ạ, an inland county, in the province of Ulster, Ireland; area, 714 square miles, of which a considerable part is bogland. The county is divided lengthwise into two nearly equal portions by Lough Erne. Limestone and sandstone are abundant. The county is divided into two divisions for parliamentary purposes, each returning one member. The principal towns are Enniskillen and Fermanagh. Its port is Ballyshannon. Pop., which has steadily declined from 156,481 in 1841, was in 1911 61,636 (56.2 per cent. Roman Catholics).

FERMAT, Pierre de, pē-ār de fār-mā, French mathematician: b. Montauban, 1601; d. Toulouse, 12 Jan. 1665. He was elected a counsellor of the Parliament of Toulouse in 1631. He was engaged in his youth with his friend Pascal in very profound investigations as to figured numbers, on which he afterward founded his calculation of probabilities, of which he may be considered the inventor. He also devoted particular attention to the general theory of numbers, and made many important discoveries in regard to it, far outstripping any of his predecessors; he squared the parabola in a much simpler way than Archimedes had done, and contributed greatly to the progress of geometry. His method of finding the greatest and least ordinates of curve lines is closely analogous to the method of the differential calculus, then unknown. He carried on a keen controversy with Descartes, whose 'Geometry and Optics' were at variance with his 'Theoria de Maximis et Minimis.' Letters of his, written in 1636, prove that he was acquainted with the method of representing curves by equations before the publication of the 'Geometry' of Descartes, hence M. Libri has declared that he shares with Descartes the honor of having invented the mode of applying algebra to geometry. His collected works were published after his death, under the title of 'Varia Opera Mathematica' (1670–79).

FERMATA, fėr-mạt'ạ ("closed"), in music a pause marked by the sign 𝄐. The notes affected by this sign are prolonged beyond the ordinary, usually double the time.

FERMAT'S LAST THEOREM, the celebrated proposition that the equation $X^n + Y^n = Z^n$ cannot be satisfied by integral values of X, Y and Z, and when n is an integer greater than 2. It was stated, though without proof, by the French mathematician Pierre de Fermat, about 250 years ago. Proofs have been found for many other remarkable theorems in the theory of numbers that were given by Fermat in the same manner, but this one has resisted all attempts at demonstration. There is no sufficient reason to believe it false, and it has indeed been proved to be true for every value of n from 3 up to about 97, and also for many special values greater than this; but no general proof, valid for all values of n, has yet been given. Many interesting things about the equation have been established, however. Only cases where the highest common factor of X and Y, of Y and Z, and of X and Z is 1, need to be considered. It is true for n, for example, if it is true for any factor of n; and this has led mathematicians to limit their study of it to the case in which n is a prime number. When n is prime, it is easy to show that the equation cannot be satisfied if any one of the three numbers

X, Y and Z is prime. It is also easy to show that when n is prime there is no solution unless $X + Y - Z$ is divisible by n. Many other similar properties are also known, but the general demonstration of the proposition does not appear to be possible by any of the methods with which mathematicians are now familiar. A prize of 100,000 marks has been offered by the Royal Academy of Sciences at Göttingen for the solution of the problem. This prize, which does not expire until about the end of the 20th century, has caused the solution of the problem to be undertaken by a large number of people from all walks of life, in the same manner as the old problem of the quadrature of the circle. Of course, the greater part of these attempts are not of the slightest value. However, Kummer developed his valuable theory of ideals in connection with this theorem, and Zermelo and Mirimanoff have brought the problem distinctly nearer solution. Consult Dickson, L. E., 'Fermat's Last Theorem and the Origin and Nature of the Theory of Algebraic Numbers,' in *Annals of Mathematics*, Vol. 18 (Lancaster, Pa., 1916–17).

FERMENTATION (from Lat. *fermentare*, from *fervere*, to boil), the decomposition of complex organic material into substances of simpler composition under the influence of nitrogenous organic subsances called ferments. The meaning of the term has undergone considerable change at different times in consequence of the progress of chemistry and biology. By the alchemists it was often used to describe any reaction accompanied by an ebullition of gas or effervescence, even when purely inorganic, but among older meanings that which comes nearest to its present signification has reference to its use to describe such familiar processes as the transformation of grape-juice into wine, the formation of alcohol from the saccharine fluids prepared from cereals, and the raising of dough in bread making. Closer examination has shown that these processes are only a few out of many of a similar kind, and now all such processes are included under the name fermentation. In its present sense it may be defined as including all chemical changes brought about through the agency, immediate or at least apparently immediate, of living micro-organisms or of organic substances immediately derived from the vegetable or animal kingdom, these substances remaining essentially the same after the reaction as they were before it, and adding nothing to the fermented substance. The organism or substance which produces the fermentation is known as a *ferment*, and in accordance with the foregoing definition ferments may be divided into two main groups, namely, (1) organized or formed ferments and (2) unorganized, unformed or soluble ferments, usually called *enzymes*. Both kinds are nitrogenous organic bodies of somewhat unstable character, and in both cases the amount of ferment required to transform a given amount of the fermentable substance is relatively very small. The organized ferments are, however, living bodies of microscopic size belonging to the groups of fungi and bacteria, and are therefore capable of growth and reproduction, while the enzymes are lifeless substances of definite chemical composition. The action of the enzymes, accordingly, is often separated from that of the organized ferments and not included under the term fermentation, but the present state of our knowledge does not seem to offer sufficient warrant for such a course.

The enzymes or unorganized ferments play an important part in the vegetable and animal kingdoms. Thus, the solid, insoluble reserve materials stored up in the seeds, roots, underground stems and other parts of plants are by their means transformed into soluble substances capable of being diffused throughout the plant-body. These enzymes are of protoplasmic origin, and are apparently complex compounds, some of them proteid, but not all. Diastase, the best known among them, is believed not to be proteid. The exact nature of their action is unknown, but all, or nearly all, produce their changes by a process known as *hydrolysis*, the nature of which may be best elucidated by citing a particular instance, the action of the enzyme *invertase* or *invertin* (see below) on cane-sugar. The molecule of cane-sugar under the influence of the ferment takes up a molecule of water, which becomes *fixed*, that is, incorporated with it, and then the combination resolves itself into the two simpler sugars, dextrose and levulose. The equation is as follows: $C_{12}H_{22}O_{11} + H_2O = C_6H_{12}O_6 + C_6H_{12}O_6$. The enzyme remains apparently unchanged, and a very small quantity of it seems capable of transforming an indefinite amount of the substance on which it acts. In one case, however, it has been proved that the enzyme forms a compound with the fermentable substance, and that the final products, including the enzyme, are then produced by the solution of this compound in water. This is probably the mode of action in all cases, and it is certainly much more intelligible than the former explanation by *catalytic* or contact action. The optimum temperature for most enzymes is between 85° and 120° F., (at 160° their activity ceases) and they are most active in the dark. The best-known enzyme is *diastase*, which is present in malted grain and converts starch into maltose and dextrin. Other enzymes are *invertase*, already referred to; *cytase*, which acts chiefly on the cellulose of the cell-walls of grain and other seeds; *inulase*, which transforms inulin into levulose in various bulbs and tubers; *emulsin*, which decomposes the glucoside amygdalin of many rosaceous plants into glucose, benzoic aldehyde and hydrocyanic acid; *pepsin*, found in gastric juice; *trypsin*, secreted by the pancreas; *zymase*, to which the alcoholic fermentation has been ascribed; and *urase*, to which the decomposition of urea into ammonium carbonate is primarily due — all of which actions are now regarded as fermentations. A further extension now under investigation regards miasmatic diseases, and virulent and contagious diseases, and the putrefaction of dead bodies as fermentations.

The organized ferments, or micro-organisms concerned in fermentation, all belong to the group of crytogamic plants known as Fungi, and their near allies the Bacteria. The most highly organized members of this group concerned in fermentation are some of the molds, but their part in fermentation is of little importance, and we need not further consider them. We may therefore discuss the micro-organisms of fermentation under the two heads: (1) Saccharomycetes, or Yeast-Fungi, and (2) Schizomycetes, or Bacteria. The Saccharomycetes are minute unicellular plants of an oval shape, surrounded by a cell-wall and containing granular protoplasm in which several vacuoles are conspicuous. They reproduce themselves by gemmation or budding, and by this means chains of cells closely resembling the hyphæ of a mycelium are formed; but very few species develop any true mycelium, such as we find in the molds and other fungi. The Bacteria, Schizomycetes, or Fission-Fungi, are a very important group of microscopic cryptogams usually classed with the fungi. Their importance arises not only from the part they play in fermentations, but also from their widespread activity in the order of nature, and especially from their action in producing numerous zymotic diseases in man and other animals. See Bacteria.

The yeast-fungi cannot assimilate free nitrogen, but they can extract it from salts of ammonia and from various organic bodies. They can take up carbon from sugars, glycerin, tartaric acid, citric acid, acetic acid, ethyl alcohol, benzoic acid, phenol and other organic bodies; but they can obtain their nutriment only in the presence of such substances as potash, lime and phosphoric acid. Unlike nearly all the bacteria, the yeasts can live in acid media if the acid be not present in excessive quantity. The presence of free oxygen is very favorable to the growth of yeast-fungi, but under these conditions the transformation of sugar into alcohol greatly diminishes in vigor. If, however, free oxygen be excluded, fermentation proceeds vigorously. The optimum temperature for the growth of yeast-fungi is from 77° to 86° F., and they seem to be quite indifferent to light and electricity. Bacteria assimilate nitrogen most readily from peptone, but many other substances can also yield. Carbon is most readily taken up from sugars, glycerin, tartrates, citrates, lactates, acetates, etc. Most bacteria are unfavorably influenced by light, and in respect to temperature there is a great diversity among the different species, some flourishing at 60° to 70° C. and others at freezing point, but for several of the best-known species the optimum temperature is 25° to 35° C. The *obligate aërobic* forms cannot live in the absence of free oxygen, while the *obligate anaërobic* kinds are destroyed by the smallest trace of free oxygen. Between these two extremes we have *facultative aërobic* species, which are generally anaërobic, but can tolerate some free oxygen, and *facultative anaërobic* species, generally aërobic but able to live when the free oxygen is much diminished. Phosphoric acid, potash, lime and similar bodies are necessary to their growth.

The most important of all fermentations due to Saccharomycetes is that by which alcohol is obtained from sugar (the sugar itself being largely that derived from the starch of barley or other cereal), and it is in connection with this process that the subject has been most thoroughly studied. The species of fungus or yeast used in this process is known as *Saccharomyces cerevisiæ*, but of this two kinds are distinguished, namely, *top yeast and bottom yeast*. The former is used in top fermentation, which is carried on at a rather high temperature (60° to 85° F.) and is rather vigorous, carbon dioxide being freely evolved and carrying the yeast to the surface. Bottom yeast is used in the slower bottom fermentation at about 40° to 50° F., in which carbon dioxide is more gently evolved and the yeast therefore remains at the bottom. Bottom fermentation is chiefly used in the manufacture of lager beer. The sugars directly fermentable by this process are those with the formula $C_6H_{12}O_6$, namely, dextrose, levulose and galactose. Cane-sugar ($C_{12}H_{22}O_{11}$) is first changed by an enzyme *invertase* (see above) contained in the yeast into dextrose and levulose, which are then fermented. The chief products of the fermentation are alcohol and carbon dioxide, but other bodies, such as glycerin, succinic acid, propyl, amyl and other higher alcohols, are also produced. The process of fermentation continues until the alcohol forms about 14 per cent of the solution, when the yeast-plant cannot continue its action any longer.

Many theories of alcoholic fermentation have been advanced. Lavoisier, treating sugar as an oxide, thought that it was chemically resolved by fermentation into two other oxides, carbon dioxide and alcohol. When the organic nature of yeast was proved beyond doubt, the physiological theory was advanced, according to which the sugar is the food of the plant and the products of fermentation are its excretions. The celebrated chemist Liebig, however, contended that fermentation was a purely chemical process, and his later opinion has been in part reverted to by more recent observers. Pasteur championed the Schulze theory that fermentation was produced directly by living organisms. Traube regarded the cells as centres for the production of enzymes, thus reducing fermentation by organized ferments to that produced by unorganized ferments. Traube's theory has gained considerable ground lately on account of the successful extraction from yeast by Buchner of an enzyme, *zymase*, which can produce all the phenomena of alcoholic fermentation. In consequence, Buchner held that the fermentative process is a result of the activity of the enzymes produced by the living micro-organisms, and that the process could be initiated and carried on independently of the presence of the living organisms.

The chief micro-organism of the vinous fermentation is *S. ellipsoïdeus*. The elliptical cells of this species are found on the grapes and in the air of grape-growing districts, and fermentation is thus set up spontaneously without the actual addition of yeast. Recently pure cultures of the wine-yeast have been prepared and used with very good results in the fermentation of grape-juice. E. C. Hansen, an able Danish investigator, has added greatly to our knowledge of the chief yeast-fungi, and has prepared and thoroughly examined several pure cultures of the three most important species, *S. cerevisiæ*, *S. pastorianus* and *S. ellipsoïdeus*. He has described six kinds in all, two belonging to the last species, three to the second and the sixth to the first, the distinctions being founded on the temperature of spore-formation and the conditions under which a surface film forms in a liquid medium. Hansen has also cultivated two pure forms of brewers' yeast, known as Carlsberg No. 1 and No. 2. Both are bottom yeasts, but the beer produced by No. 1 has less carbon dioxide than that of No.

2, and is used chiefly for bottling, the No. 2 beer being preferred for export.

Of the fermentations set up by bacteria only some of the most important can be referred to here. (1) *Acetic Acid Fermentation.* In this fermentation alcohol becomes oxidized into acetic acid, the total reaction being representable by the equation:

$$C_2H_5OH+O_2=C_2H_4O_2+H_2O.$$

The microbe concerned in the fermentation, if allowed to continue its action, will oxidize the acetic acid into carbon dioxide and water. Two bacilli, namely, *Bacillus aceti* and *B. pasteurianus,* have been described as taking part in this important fermentation, which is the basis of the commercial manufacture of vinegar from wine. (2) *Lactic Fermentation.* The souring of milk which has stood for some time is due to this fermentation, by which the milk-sugar becomes transformed into lactic acid through the agency of bacteria. Carbon dioxide is an invariable product of the fermentation. (3) *Butyric Fermentation,* often set up in milk which has undergone the lactic fermentation. (4) *Nitrification of Ammonia,* a process of vital importance in nature, by which organic nitrogen becomes fixed in soils as nitrate and nitrites. The process of decay and putrefaction, with the production of *ptomaïnes,* also belong to this section of the subject of fermentation. See ALCOHOL; BREWING AND MALTING; DISTILLED LIQUORS; ENZYMES; VINEGAR; WINE.

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FERMENTED LIQUORS. See DISTILLED LIQUORS.

FERMENTS. See FERMENTATION.

FERMO, fĕr'mō (ancient FIRMUM PICENUM), Italy, city in the province of Ascoli Piceno, 32 miles south-southeast of Ancona. It stands over 1,000 feet above sea-level, and commands a magnificent view of the Adriatic. It was founded by the Sabines before Rome existed; and has remains of old walls. It has a cathedral built on the site of a mediæval castle and with some interesting 16th century monuments, and an archiepiscopal palace dating from 1391, a town-house, part of which dates from the 14th century; collections of statuary and paintings. Its harbor is situated on the Adriatic, about three miles distant. Pop. of commune, 22,570.

FERMOY, fĕr-moi', Ireland, urban district in the county of Cork, 22 miles north-northeast of the city of Cork, on the Blackwater. On the river opposite to the town are infantry, artillery and cavalry barracks, accommodating about 3,000 men. There are here Fermoy College, Saint Coleman's Roman Catholic College, two convents and a handsome Roman Catholic cathedral. It is situated in a rich agricultural district, and has some large flour-mills and a brewery. Pop. 6,863.

FERN FANNY. See PARTON, SARA PAYSON WILLIS.

FERN, Male (*Dryopteris filix-mas*), a native fern of the northern part of the United States and of Europe, Asia, Africa and South America. In medicine the rhizome is used. It contains an active oleoresin, the most important constituent of which is filicic acid, and is a very efficient remedy for the treatment of tapeworm, particularly of the genus *Tænia.* Other American species of the same genus, *D. marginale, D. goldianum,* contain small amounts of the same oleoresin as that found in male fern, and can be used for much the same purposes.

FERN-OWL, the common British nightjar (*Caprinmulgus europæus*), which goes by many other provincial names, as «goat-owl» and «churn-owl,» due to the noises it makes and an erroneous supposition that it is a kind of owl. (See NIGHTJAR). Consult White's ‘Selborne.’

FERNALD, fĕr'năld, **Bert M.,** American statesman: b. West Poland, Me., 3 April 1858. He was educated in the public school of West Poland, at Hebron Academy and in business and preparatory schools of Boston. He was elected to various offices in his town, county and State, including that of representative to the legislature, two terms as State senator and in 1909 governor. He served two years as governor of Maine. On 11 Sept. 1916 he was elected to the Senate of the United States for the term ending 3 March 1919. He is president of the Poland Telephone Company, and director of the Fidelity Trust Company of Portland, and of the Poland Dairy Company.

FERNALD, Charles Henry, American zoologist: b. Mount Desert, Me., 16 March 1838. He was an acting ensign in the United States navy during the Civil War; and professor of natural history at the Maine State College in 1871–86. From 1886 to 1910 he was professor of zoology at the Massachusetts Agricultural College. He also became entomologist to the State Board of Agriculture. He was made honorary director of the graduate school in 1910. His publications include ‘Tortricidæ of North America’ (1882); ‘The Crambidæ of North America’ (1896); ‘The Pterophoridæ of North America’ (1898); ‘Pyralidæ of North America’; ‘The Brown-Tail Moth’ (1903); ‘The Genera of the Tortricidæ and Their Types’ (1908), etc.

FERNALD, Chester Bailey, American playwright and author: b. Boston, Mass., 18 March 1869. He was educated at the Episcopal Academy, Philadelphia, and by private tutors. In 1889 he settled in California, where he was assistant draftsman in the United States navy for four years. In 1893–94 he was Washington correspondent of the San Francisco *Chronicle.* He traveled extensively in the United States, Alaska, China, Japan and European countries, especially in England, where he became a resident in 1907. His plays include ‘The Cat and the Cherub’ (1897); ‘The Moonlight Blossom’ (1899); ‘The Ghetto’ (1899); ‘The Married Woman’ (1911); ‘98.9’ (1912); ‘The Pursuit of Pamela’ (1913); ‘The Day before the Day’ (1915). He is also author of ‘The Original Papers’ (1892); ‘The Cat and the Cherub’ (1896); ‘Chinatown Stories’ (1899); ‘Under the Jackstaff’ (1904); ‘John Kendry's Idea’ (1907).

FERNALD, James Champlin, American Baptist clergyman and author: b. Portland, Me., 18 Aug. 1838. He was graduated at Harvard 1860 and at Newton Theological Seminary 1863, and was ordained to the Baptist ministry 1864. He settled in Ohio, holding pastorates in Granville and Springfield, removing to New York in 1889. He has since been editor of ‘Synonyms,’ ‘Antonyms’ and ‘Prepositions in the Standard Dictionary’ and editor-in-chief of the ‘Students’ Standard Dictionary’; the ‘Desk Standard Dictionary’ (1915); also of the ‘Comprehensive,’ the ‘Concise’ and the ‘Vest-Pocket’ abridgments of the ‘Standard Dictionary,’ of the ‘Homiletic Review,’ associate editor of the ‘Columbian Cyclopedia,’ etc. He was dean of the department of English Intercontinental University, Washington, D. C., 1905–09. Among his works are ‘The Economics of Prohibition’; ‘The New Womanhood’; ‘Synonyms, Antonyms and Prepositions of the English Language’; ‘The Spaniard in History’ (1898); ‘The Imperial Republic’ (1898); ‘Home Training of Children (1898); ‘True Motherhood’ (1900); ‘Connectives of English Speech’ (1904); ‘A Working Grammar of the English Language’ (1908); ‘English Grammar Simplified’ (1916).

FERNANDEZ, Angel, än-hăl′ fĕr-năn′deth, Spanish writer: b. Madrid, Spain, 27 July 1821; d. Paris, 18 June 1880. He founded a number of journals some of which, on account of their anti-monarchial tendencies, were short lived. His active participation in republican politics finally resulted in his banishment, and from 1866 to 1868 he lived in Paris. After his return to Spain in 1869 he was made a senator and somewhat later headed a Spanish mission to Portugal. In 1876 he was again exiled and returned to Paris where he continued to live until his death. Besides a large number of essays on the politics and resources of the Peninsula he wrote ‘Tesoro de Cuentos,’ a collection of stories; ‘Guia de Madrid’ (1876), a history of Madrid; ‘O Todo ó Nada’ (1876), an anti-Bourbon prose study of social conditions; ‘Mi Mision en Portugal’ (1877); ‘La Exposicion de 1878’ (Paris 1879); ‘Luchas Políticas’ (1880).

FERNANDEZ, Juan, hoo ăn′ fĕr năn′deth, Spanish navigator and explorer: b. probably Cartagena, Spain, 1536; d. Ligna, Chile, 1602. He was a leading pilot on the South American coast. In sailing between the ports he began the practice of standing out to sea, benefiting by the trade winds and thus shortening the time of the voyage, and for his expeditious passage narrowly escaped condemnation as a sorcerer. He discovered the island which was named after him, 1563, and tried to establish a colony there, but failed in this enterprise. He also discovered the islands of Saint Felix and Saint Ambrose 1574. He is also reputed to have discovered either Australia or New Zealand. The sojourn of Alexander Selkirk upon the island of Juan Fernandez probably suggested ‘Robinson Crusoe’ to Defoe.

FERNANDEZ DE CASTRO, Manuel, Spanish geologist: b. Madrid 1825; d. 1895. He received his education at the School of Mines of Madrid and subsequently traveled in several countries with the object of investigating their railway systems. In 1857 he published ‘La electricidad y los caminos de hierro,’ in which he proposed a signal system which was long popular in Europe. For the ensuing 10 years he was employed in mining and geological investigations for the government, and in 1869 was appointed professor at his *alma mater.* In 1873 he was made chief of the commission charged with bringing out a geological map of Spain.

FERNANDEZ DE CORDOVA, Diego, dē-ā′gō fĕr-năn′deth dā kor′dō-vă, Marquis of Guadalcázar, Spanish statesman: b. Cordova about 1580; d. after 1629. He was made viceroy of Mexico in 1612, being the 13th incumbent of this office and holding the office till 1621. He founded there the cities of Lerma, Cordova and Guadalcázar, completed the Mexican aqueduct from Chapultepec to Mexico and was viceroy of Peru from 1622–29. He gave to the latter country an administration resulting in a considerable amount of peace and prosperity, after he had successfully repelled an attempt of a Dutch squadron to blockade Callao and to capture Lima. Consult Bancroft, H. H., ‘History of Mexico’ (Vol. III, San Francisco 1883); Lavalle, J. A. de, ‘Galeria de Retratos de los Gobernadores y Virreyes del Perú, 1532–1824’ (Barcelona 1909); Rivera, M., ‘Los Gobernantes de México, etc.’ (Vol. I, Mexico 1872).

FERNÁNDEZ DE ENCISO, ĕn-thē′sō, **Martin,** Spanish jurist: b. about 1470; d. 1528. In 1500 he set out for America and settled as advocate in Santo Domingo. He invested nearly his entire fortune in Ojeda's expedition for colonizing Tierra Firme, and he followed the latter in 1510. He found that Ojeda had left the colony to seek ammunition and provisions and gathering the survivors Fernandez founded Darien. Balboa deposed him and he returned to Spain, returning with Pedrarias in 1514. His ‘Suma de geografía’ (1519) was the first account of the Spanish dominions overseas and for a pioneer work of the day and period is remarkably accurate.

FERNANDEZ DE LA CUEVA, dā lä kwā′vă, **Francisco,** Duke of Alburquerque, Spanish statesman: b. about 1610. He was appointed viceroy of Mexico 1653, being the 22d incumbent of this office and holding the office until May 1661. In March 1660 a soldier made an unsuccessful attempt to assassinate him while he was saying his prayers in the cathedral. During his term the city of Mexico was greatly developed and the cathedral completed. His later years were spent as viceroy of Sicily. The date of his death is not known. Consult Bancroft, H. H., ‘History of Mexico’ (Vol. III, San Francisco 1883); Rivera, M., ‘Los Gobernantes de México, etc.’ (Vol. I, Mexico 1872).

FERNANDEZ DE LIZARDI lē-thăr′dē, **José Joaquin,** Mexican novelist: b. City of Mexico 1774; d. there, 21 June 1827. Most of his books were written over the pseudonym «El Peusador Mexicano.» His most famous work is ‘Periquillo Sarniento’ (Mexico 1816, 9th ed., 1884). He also published three other novels: ‘Noches Iridtes’ (Mexico 1818); ‘Don Catrin de la Fachenda’ (Mexico 1832); ‘La Quijotita y su Prima’ (Mexico 1831). For a complete list of all his writings consult

Obregon, L. G., ‘Don J. J. Fernandez de Lizard’ (Mexico 1888).

FERNANDEZ DE PALENCIA, pä-lĕn'-thē-ä, **Diego**, Spanish-American historian: b. Palencia, Spain, about 1520; d. Seville 1581. About 1545 he went to Peru. He was apparently a soldier of fortune, lured to the scene of Pizarro's great conquest in the hope of fabulous wealth. He had some fighting experiences, but later was given the official title of chronicler of Peru by one of the Spanish viceroys. He wrote ‘Primera y segunda parte de la Historia del Péru’ (Seville 1571), a narrative of Peruvian history from about 1545–65. It is a comparatively well-written work, full of details, and, though naturally strongly biased in favor of the Spanish government, an authentic source for the events of its period as the author had full access to the official Spanish documents. Consult Prescott, W. H., ‘History of the Conquest of Peru’ (2 vols., New York 1847, London 1902).

FERNANDEZ MADRID, mä-thrĕth, **José**, Colombian poet and statesman: b. Cartagena, Colombia, 9 Feb. 1789; d. near London, England, 28 June 1830. He studied law and medicine and participated in the popular revolt against the Spanish rule in 1810. After its success he was made, in the same year, Attorney-General of the new republic of New Grenada and in 1811 was elected to Congress. He was for a short time President of his country in 1816, but was captured by the Spanish and sent as a prisoner to Cuba where for nine years he was prominent as a physician. In 1825 he escaped and returned to Colombia. In the same year President Bolivar sent him on a diplomatic mission to Paris. In 1827 he went to London where he represented his country until his death. He published a volume of poems ‘Las Rosas’ (1822); also two tragedies, ‘Atala’ (1822), and ‘Guatimozin’ (1827). A second edition of his collected poems was published shortly before his death.

FERNANDEZ NAVARRETE. See Navarrete, Juan Fernandez.

FERNANDINA, fĕr-nan-dē'nạ, Florida, city, port of entry and county-seat of Nassau County, on Amelia Island, Amelia River and the Seaboard Air Line Railroad, 33 miles north by northwest of Jacksonville. The city's export trade amounts to about $7,000,000 annually, the principal articles of shipment being bluefish, phosphates, turpentine, lumber, naval stores, cotton, etc. Its manufactures are lumber, canned oysters, plastering fibre (made from palmetto) and cotton goods. It exports cotton, phosphates, lumber, plastering fibre and canned goods. It is a favorite winter resort and contains a public library and county courthouse. A shell road leads to Amelia Beach, and nearby is Cumberland Island, the home of Gen. Nathanael Greene (q.v.). Settled by Spaniards in 1632, Fernandina was laid out in 1856 and incorporated in 1859. The government is administered under a revised charter of 1899, which provides for a mayor, elected biennially, and a city council. The waterworks and electric-light and ice plants are owned and operated by the municipality. Pop. 3,482.

FERNANDO DE NORONHA, fĕr-nän'dō dä nō-rōn'yä, an island of volcanic origin, in the South Atlantic, lat. 3° 50′ S., long. 32° 25′ W., about 225 miles east-northeast of Cape Saint Roque, belonging to Brazil; area, about 12 square miles. It has a rugged, mountainous, wooded surface and is used as a penal settlement for Brazilian male criminals. Its population is about 2,000, of which some three-fourths are convicts who cultivate the fairly productive soil. It is reached by steamer from Pernambuco and was named after the Portuguese Count de Noronha who discovered it and the few smaller islands nearby in 1503. Due to its location outside of the regular roads of travel, little was known of this island for many years after its discovery. Darwin stopped there for a few hours on his famous trip around the world. The *Challenger* expedition made a landing in 1873, but was not permitted to make any extensive explorations and not until 1876 when the Imperial Geological Survey of Brazil paid an official visit, did facts concerning its geology, fauna, etc., become generally known. Consult Anon., ‘A Brazilian Convict Island’ (in *Chambers' Journal*, Vol. LXX, p. 116, London 1893); Branner, J. C., ‘Notes on the Fauna of the Islands of Fernando de Noronha’ (in *American Naturalist*, Vol. XXII, p. 861, 1888); Branner, J. C., and Williams, G. H., ‘Geology of Fernando Noronha’ (in *American Journal of Science*, Vol. CXXXVII, pp. 145 and 178, New Haven 1889); Pereira da Costa, F. A., ‘A Ihla de Fernando de Noronha, etc.’ (Pernambuco 1887); Rattray, A., ‘A Visit to Fernando Noronha’ (in *Royal Geographical Society Journal*, Vol. XLII, p. 431, London 1872); Thomson, Sir C. W., ‘The Voyage of the Challenger’ (2 vols., New York 1878; 40 vols., Edinburgh 1880–95).

FERNANDO PO (Spanish fĕr-nän'dō pō'), an island which belongs to Spain, in the Bight of Biafra, 20 miles from the West African coast. It is of volcanic origin, about 40 miles in length by 20 miles in breadth; area, 1,185 square miles. It is mountainous and covered with dense forests of valuable timber, while the land gradually rises from the steep and rocky coasts culminating in Clarence Peak, 10,190 feet above sea-level. It is well watered, and is one of the most fertile spots on the West African Coast. Sugar cane and oil palms, cotton and indigo plants grow in abundance; mahogany, ebony and African oak are among the woods. Yams form the staple food; birds and fish are plentiful. The climate is hot and very unhealthful. The capital is Port Clarence (Santa Isabel). It is inhabited by Bubis and Portos. This island was discovered in 1471 by the Portuguese, who ceded it to Spain in 1778. The Spaniards eventually abandoned it, and the British, in 1824, selected it as a suitable military depot and naval station. They, in their turn, abandoned it in 1834, on account of its unhealthfulness. The Spaniards again took possession in 1844. It was used by them as a penal settlement, and to it Cuban patriots were deported. Considerable development has taken place since the Spanish-American War. Pop. 25,000.

FERNE ISLANDS. See Farne Islands.

FERNEY, or **FERNEX**, făr-nā, France, town in the department of Ain, about five miles north of Geneva. It is noted for having been the chief residence of Voltaire (who in fact founded it) from about 1760 to 1778. The house in which he lived is still standing, and the church, with the inscription «*Deo erexit Voltaire,*» is now a farmhouse. Pop. 1,172.

FERNIE, Canada, an important town of the Kootenay district of British Columbia, on the Crow's Nest branch of the Canadian Pacific Railway, at the confluence of Coal Creek and the Elk River, 300 miles east of Vancouver. It has a custom house, public and high schools, courthouse and two hospitals. Its industrial establishments comprise saw mills, railroad repair shops, foundries, machine shops and brick yards. The chief industry is coal-mining; there being extensive mines nearby. Pop. 6,000.

FERNKORN, Anton Dominikus, ăn'tōn, dō-mi-ni-koos' fĕrn'korn, Austrian sculptor: b. Erfurt, Saxony, 17 March 1813; d. Irrsin, near Vienna, 16 Nov. 1878. He studied under Stiglmayer and Schwanthaler 1836–40, and attracted attention by his first group, 'Saint George and the Dragon,' the Austrian government then appointing him director of the Imperial bronze foundry at Vienna, where he executed his masterpiece, a colossal statue of Archduke Karl 1860, and his statue of Prince Eugéne 1865. Among his other works are a colossal bust of Radetsky; a marble statue of the poet Frederick Heffel, and a monument of Ressil.

FERNOW, Bernhard Eduard, American scientist: b. Inowraclaw, Germany, 7 Jan. 1851. He was educated at the University of Königsberg and Academy of Forestry, Münden; removed to the United States in 1876 and engaged in metallurgical work; and was chief of the division of forestry in the United States Department of Agriculture in 1886–98. In the latter year he was made director and dean of the New York State College of Forestry at Cornell University until 1905. He then organized the faculty of forestry at State College, Pennsylvania. In 1907 he was called to the University of Toronto as dean of the newly created faculty of forestry. He became a member of the Commission of Conservation of Canada on its organization in 1910. He is the author of 'The White Pine' (1899); 'Report upon Forestry Investigations of the United States Department of Agriculture 1877–98' (1899); besides many other official reports and bulletins, and of three volumes, 'Economics of Forestry' (1902); 'History of Forestry' (1907) and 'The Care of Trees' (1911). He is publisher and editor of the only American professional journal of forestry, the *Forestry Quarterly,* since 1902.

FERNS and FERN-ALLIES. The ferns are representatives of an extensive branch of the plant world technically known as *pteridophytes,* standing between the mosses and hepatics (*bryophytes*) on the one hand and the cycads and conifers (*gymnosperms*) on the other, at the head of the now obsolete subdivision of plants known as cryptogams. They resemble the former groups so closely in their method of sexual reproduction and in showing alternating phases of growth that both mosses and ferns are often united under a single primary division of plants as *archegoniates,* so called from the common possession of a structure described below as the archegone. The ferns differ from the mosses in their highly developed vascular or woody system seen in the fibrous strands of the leaf-stalks and the veins of the leaves, and so are still sometimes called vascular cryptogams. Besides the ferns, popularly so known, there are various groups of plants closely allied to ferns which with them make up the branch pteridophytes. Among these fern-allies are the running-pine or ground-pine, familiar in its use for Christmas decoration, the selaginellas frequent in cultivation, the field horsetail and the scouring-rush. These will be treated in their proper sequence below.

The mature fern-plant, which may stand as a representative pteridophyte, consists of a woody axis bearing scattered or clustered leaves according as this axis is a creeping structure or an upright trunk. In our northern species this axis is either below the surface of the ground or just at the surface, but in some of the species of tropical regions it often forms a trunk from 1 foot to 50 feet in height, or even more, bearing its leaves at the summit and forming a treefern.

On the under surface of certain leaves of ordinary ferns little clusters of stalked bodies (*sporangia*) appear, which are variously arranged in different species, in rounded or linear masses (*sori*) or in a few species are scattered over the surface of the leaf. These structures consist of a membraneous wall enclosing minute bodies — the fern-spores. These are the reproductive bodies of the fern asexually produced by repeated division of the interior portion of the young sporangium, and are often popularly known as «fern-seeds.» This is a misnomer, for they rather find their homology with the pollen-grains and young embryosacs of the higher plants. In the sporangia of some ferns a series of peculiar cells serves the purpose of rupturing the sporangium wall, and by an elastic movement scatters the spores at some distance from the plant producing them. Either at once or after a period of rest the fern-spore sprouts and produces a green hepatic-like structure known as a prothallus. This is a flat expense of soft green tissue, usually more or less heart-shaped, and ranging up to a half inch or more in diameter. It forms root-hairs beneath, and grows exactly like an ordinary new plant. On its under surface among the root-hairs two sorts of structures are produced: (1) A series of rounded bodies known as antherids, in which minute motile cells are formed known as antherozoids, these being the male or sperm cells connected with the sexual reproduction of the fern; (2) a series of flask-shaped bodies (archegones) more deeply imbedded in the tissues of the prothallus, which contain a single specialized cell at the bottom of the flask, known as the egg, this being the female reproductive cell. The sperm-cells escaping from the antherid swim in the delicate film of moisture which may bathe the surface of the prothallus, swarm about the mouth of the archegone, and one of them enters the neck of the flask-like structure, penetrating the mucilaginous contents of its tube, and fuses with the egg, thus effecting a true sexual reproduction. The fertilized egg soon commences division, increases in size and develops a primary root and leaf, ultimately growing into a new fern-plant. The two alternating phases of growth in the life period of the fern are thus strongly marked; the sexual phase (prothallus) is often known as the gametophyte, and the asexual phase (the fern-plant) which follows is known as the sporophyte or spore-producing phase.

In some of the fern-allies like *Marsilia* and *Selaginella* the plants produce two kinds of spores, (1) microspores, which develop into prothalli producing only antherids, and (2) macrospores, which develop into prothalli producing only archegones. In these plants, particularly *Selaginella*, the prothallus is much reduced in size, and the sexual reproduction approaches that of the pines and other conifers, except that it takes place away from the plant producing the spores. The microspores of *Selaginella* are thus the exact counterparts of the pollen-grains of the pine, and the macrospores correspond to what is known as the embryo-sac in the young pine-cone, to that part of the ovule in which the egg-apparatus appears, and in which the seed is ultimately developed.

Ferns are distributed all over the world but diminish in the number of species, in the profusion of individuals, and in the relative proportion to the total vegetation of the locality as we pass from tropical to polar regions. Moist insular climates are best adapted to their development. Java has 575 species of ferns, while New York State with about the same area has scarcely one-tenth as many. Jamaica, with about the area of Connecticut, has nearly 500 species; Hawaii, Samoa, New Zealand and the Philippines are other prolific regions. While moist conditions favor fern-growth and development, certain species have adapted themselves to dry climates and grow on open exposed rocks of semi-arid regions. Such ferns are provided with woolly hairs, tangled scales, waxy powder or other mechanical contrivances to conserve their moisture. One species of the so-called «resurrection plants» (*Selaginella lepidophylla,*) of the arid regions of the Southwest conserves its moisture during the dry season by coiling its branches inward so as to form a compact ball. On the return of moisture it flattens out and exposes its fresh green surface. The «resurrection-fern» curls up in a similar way, its under surface being protected by a layer of scales. It grows on trees in the Southern States and the West Indies.

The ferns of temperate regions are terrestrial in their habit, but as we approach the tropics a large number become epiphytic, growing with mosses and orchids on the trunks and branches of trees. The filmy ferns frequently cover the trunks of tree-ferns completely.

There are over 5,000 described species of pteridophytes in the present flora of the world, which are grouped according to their characters under seven distinct orders. Of these we have nearly 290 species within the limits of the United States.

Geologically, the pteridophytes are a very old group dating back to the Devonian and reaching their first culmination during the Carboniferous Age, in which they formed the bulk of the vegetation of the coal-measures. Many of the fossil formerly described as ferns, however, are really primitive seed-plants closely allied to the ferns. (See PTERIDOSPERMS). Besides ferns, some of the fern-allies of those times attained very great size, as shown in the giant trunks of *Lepidodendron* and *Sigillaria*, related to the modern club-mosses, and in the large stems of *Calamites*, related to our present diminutive scouring-rushes. The various types of the modern pteridophytes and their distinctive characteristics will be treated under their respective orders, arranged, as nearly as a lineal series can show it, in their relative rank in the scale of vegetable life.

I. **Filicinæ.** A. *Eusporangiatæ.*— The adder-tongues and grape-ferns are eusporangiate; that is, their sporangia develop from the interior tissues. They include plants of a fleshy texture, bearing their thick-walled sporangia in spikes or panicles. The prothallus, so far as known, is subterranean and colorless. We have in the United States seven species of adder-tongue (*Ophioglossum*), and 17 species of grape-ferns (*Botrychium*), the former having the sporangia in spikes and the latter having them in panicles. All our northern species are terrestrial plants with fleshy roots. *Cheiroglossa palmatia* of Florida and the West Indies is a hanging epiphyte growing on palmetto-trunks and on other trees, and the curious strap-like *Ophioderma* of Hawaii and other Pacific isles grows in similar situations, with its pendant leaf from two to five feet long. The order *Ophioglossales* represents the simplest type of fern-growth in existence, and probably the oldest type as well. The species (about 60) are not numerous, but are very widely distributed.

The Marattiaceæ include only tropical ferns of a coarse habit, ranging from 2 feet to 10 feet in height. They are eusporangiate like the last order, but have the coiled-bud form of the true ferns. They also bear their sporangia dorsally, that is, on the under surface of the leaf, but these are formed in special boat-like receptacles known as synangia. *Marattia* and *Danæa* are the two principal genera. Two species of the former and nine of the latter are found in the North American tropics. The order is a smaller one than the last and, like it, consists of a single family.

B. *Leptosporangiatæ.*— The ferns proper, including nearly 4,000 species, are divided unequally among the eight families of this subclass. They are leptosporangiate (that is, the sporangia develop from the epidermal tissues), and all produce green prothalli of the type described above. Except the *Matoniaceæ*, a small family of two species, all are represented in America. Two families are tropical only, while the remaining five are also represented in the United States.

1. The flowering ferns, so called because the sporangia are panicled, are among the conspicuous features of our northern swamp vegetation in spring and early summer. The cinnamon-fern grows in great crowns, sending up its spore-producing leaves, which have a rich cinnamon color, a short time in advance of its rich crown of foliage-leaves. The royal flowering-fern grows in similar locations, but is larger, has more compound foliage, and bears its panicle at the summit of the foliage-leaf. The flowering ferns (*Osmunda*), with two genera from New Zealand and Africa, make up the family *Osmundaceæ* with 16 species. In this family the ring of the sporangia is rudimentary and the sporangia opens longitudinally.

2. The Hartford fern or climbing fern (*Lygodium*) is the type of a second small family. Our species is low-growing, only two

or three feet high, and twines closely about other vegetation. It is quite local, but where it grows it sometimes forms tangles. In Connecticut it is so rare that it is protected by law. The tropical species of this genus often climb trees for 40 feet or more. Another member of the same family is the curious curly-grass (*Schizæa*) of the pine-barrens of New Jersey. It is wholly unlike ordinary ferns, the foliage-leaves resembling curled grass-leaves and the spore-bearing leaf resembling a small sedge. The entire plant is only four or five inches high. These two species with two subtropical species of *Ornithopteris* form our four representatives of the family *Schizæaceæ*, whose 80 species are largely South American, though several species occur in the Old World. They are characterized by their pear-shaped sporangia with an apical ring. The sporangia are usually borne in spikes or panicles.

3. The *Gleicheniaceæ* are found in the tropics of both hemispheres, several species of *Dicranopteris* occurring in the uplands of the West Indies, forming almost impassable tangles or thickets. These ferns, instead of uncoiling at once, produce buds in the axils of the forked branches, and as the lower portions mature these buds develop successive upper growths. The tangles thus formed are often sufficient to bear the weight of a man, and it is possible to walk for some distance on these thickets.

4. The floating-fern (*Ceratopteris*), found rarely in Florida and Louisiana, and occasionally throughout the tropics of both hemispheres, is almost the only aquatic representative of the order. Its sterile leaves float on the surface of shallow waters, and its pad-like fertile ones project above the surface. The name *Ceratopteris* is derived from this fertile leaf, which branches like a deer's horn, and gives the name to the family *Ceratopteridaceæ*.

5. The tree-ferns of both hemispheres form a separate family *Cyatheaceæ*, though several members of this family are very diminutive, and ferns with trunks occur occasionally in other families. No tree-ferns occur in the United States, but 30 species or more are found in the higher altitudes of the West Indies, and many more occur in other tropical regions. In some portions of the mountains of Jamaica tree-ferns form half or three-fifths of the forest vegetation, the trunks ranging from 6 to 50 feet in height. A well-developed tree-fern forms one of the most beautiful types of vegetation, rivaling the palms in grace and perfection of form. Some 200 species have been described, belonging chiefly to the genera *Cyathea, Alsophila, Hemitelia, Dicksonia* and *Cibotium*.

6. The great mass of our ferns belong to the family *Polypodiaceæ*, often known as the true ferns, perhaps for no better reason than that they were the first to be called by the name of ferns. The members of this family have definitely stalked sporangia, always provided with an elastic vertical ring which causes the sporangium to burst transversely and thus disperses the spores. In some species, like the stag-horn fern, the sporangia are spread over the underleaf surface in a uniform layer; in others, like the spleenworts and bird's-nest fern, they are in definite lines; while in our common polypody, the maidenhair, and the wood ferns they are in small rounded masses (sori). In some species the sorus is naked, but in most it is covered by a small membrane (indusium), primarily for the purpose of protecting the young sporangia. In some ferns, like the spleenworts, the indusium develops along a vein; in others, like the Christmas-fern, it is attached at one point and covers the sorus like an umbrella; in still others, like the maidenhair, it is formed of a modified portion of the margin of the leaf folded under so as to cover the young sporangium. The nature and position of the indusial covering forms one of the leading characters for the separation of genera under the Hookerian scheme of classification, while the Preslian scheme lays stress on the character of the venation, the fundamental branching of the fibro-vascular system of the plant. A more rational and natural scheme combines with these the habitual and biological characters that serve to group in each genus ferns that really have a natural relation to one another.

In so large a group of plants as that presented by this family we must expect to find the greatest diversity of size and structure, dependent on the geographical distribution, the altitudinal distribution, and on the ecological conditions under which the various members of the family have become developed. Marsh, swamp, rocky hillside, cliff and moist ravine each have their characteristic species in every country, while the trees of every tropical region support an extensive epiphytic series which varies with every considerable change of altitude. Even exposed cliffs in semi-arid regions support their own peculiar ferns, which have become adapted to conditions that at first would appear wholly unsuited to fern-growth. Obviously only a few of the more common species which grow wild or in cultivation can be mentioned here.

The sword-fern (*Nephrolepis*), some forms of which are known in cultivation as the "Boston Fern," is a native of tropical America, occurring frequently in peninsular Florida. In its native haunts it is more commonly found on the trunks of palm-trees, though it often grows on the ground or on rotten wood. It is a favorite in cultivation, either in hanging baskets or in jardinières, and requires a rich soil and moist surroundings to thrive best. The sori are provided with a kidney-shaped indusium.

The maidenhairs (*Adiantum*) are perhaps the most graceful of the herbaceous ferns. Over 60 species are known, many of which have long been in cultivation. The luxuriant split-leaved *A. Farleyense* and the numerous fine-leaved varieties of *A. cuneatum and A. gracillimum* are among the most graceful in cultivation. Owing to their readiness to wilt most maidenhairs thrive best in Wardian cases.

In late years Japanese fern-balls have become popular in cultivation, consisting of the slender rootstocks of a species of *Davallia* wrapped about a mass of peat-enclosed soil, and held in form by wires. The Davallias are graceful ferns mostly confined to the Old World, though related genera are found in the American tropics. Numerous species are found in cultivation in the larger conservatories. Among our wild species the ostrich-fern (*Matteuccia*) is one of the best for out-of-door cultivation, to which it readily yields. It grows in graceful crowns from an erect rootstock, and has a bright green color. Its spore-bearing leaves are curiously rolled together so as to have the appearance of pods containing the copious sporangia. It requires a moist soil for its growth, and when growing wild thrives best in low ground. Other ferns suited for bed-cultivation are the graceful wood-ferns (*Dryopteris spinulosa*, and related species) and the Christmas-fern (*Polystichum*), both with dark foliage and crown-like habit, and the hay-fern (*Dennstædtia*) with a foliage of lighter green and a more scattered habit of growth resulting from its creeping rootstocks. The wood-ferns and Christmas-fern are firm in texture, and remain green throughout the winter; the hay-fern dies down with the early frosts. Another delicate pale-green species suitable for cultivation is the New York fern (*Dryopteris Noveboracensis*), which, however, has a range from New England to Alabama.

For rockeries the bladder-fern (*Filix fragilis*), the smaller spleenworts (*Asplenium trichomanes* and *A. platyneuron*), the rock-brake (*Pellæa*), and the curious walking-leaf are common among the best native species; and all thrive best if the rocks are part limestone. The last-named fern has a peculiar habit among our native species, shared, however, by many exotic ferns. The leaf, which is simple and tapers to a slender point from a rounded lobed base, takes root at the apex and forms a new plant, whose leaves may again take root and form still other plants. This peculiarity of taking steps away from the mother plant has given the name walking-leaf to this small fern, whose leaves range from 4 to 10 inches in length.

Aside from decorative value, ferns have little utility. The matted tufts of soft hair-like scales of some of the Hawaiian tree-ferns (*Cibotium*) are collected in commercial quantities and used for filling mattresses under the name «pulu.» The male-fern (*Dryopteris filix-mas*) and some of its near allies are used in medicine as a vermifuge, and the soft parts of certain species are used for food. The mission of the fern, however, seems to be an æsthetic one, to minister grace and beautify the duller and more prosaic sides of nature.

7. In point of grace and delicacy none of the ferns as ordinarily known can equal the filmies, which flourish best at the higher elevations of tropical lands. These ferns differ from the true ferns not only in the form of the sporangium, and its attachment to a thread-like receptacle, but also in the texture of the leaf, whose blade is often only a single cell thick, so that the leaf is strongly translucent. The filmy ferns belong chiefly to the genera *Trichomanes* and *Hymenophyllum*, and although many are apparently so simple, the *Hymenophyllaceæ* form one of the most highly differentiated families among the ferns. A few others simulate them in texture, like the delicate New Zealand species of *Leptopteris* and some species of *Asplenium* in the American tropics, but these are representatives of two distinct families. The genus *Loxsoma* represents a structural connecting-link between the genus *Davallia* and the filmy ferns, and this is apparently their only point of kinship. Two species of *Trichomanes* occur under moist rocks in some of our Gulf States, one of them scarcely over a half inch in height.

C. *Salviniales*.— Next to the ferns are the members of this order, in which spores of two sorts are produced in special conceptacles resembling small pods or spheres. There are two types of habit represented, one series (*Salviniaceæ*) floating on the surface of water, and the other (*Marsiliaceæ*) rooting in mud: *Salvinia*, with oval leaves, is occasionally seen in cultivation but is rare in a wild state. *Azolla* is found in great abundance in Florida, sometimes covering the surface of ponds with its delicate branching small-leaved stems. A second species occurs in California. *Marsilia* is the type of the second family, and has a four-parted leaf resembling that of *Oxalis*. It grows on the wet borders of ponds, or if the water becomes high, it elongates its leaf-stalks and the leaves float on the surface like four-leaf clovers. Its conceptacles are oval and are borne on short stalks. One species grows abundantly at Bantam Lake, Connecticut, and others in Florida and in the Far Northwest where they are more common. *Pilularia* is a second genus of the family with thread-like leaves, and spherical pill-like conceptacles. Our single species occurs in California, Oregon and Arkansas.

II. **Equisetinæ.**—About 25 species forming a single genus and family make up this order. There are two types of growth, both common species of *Equisteum*, which have received different popular names. One is the field horsetail, which appears in low sandy ground early in spring, sending up a flesh-colored stalk terminating in a cone, followed by the «horsetails,» which are the vegetative parts of the plant, consisting of a central hollow stalk with angular whorled branches. The leaves are reduced to sheaths encircling the stem. Under the surface-shields that cover the cone, the spores, which in mass resemble a fluffy mold, are borne in sporangia. The peculiar appearance of the spores is due to the fact that each is surrounded by an outer covering which splits spirally into four branches arranged cross-like at one end of the spore. These are exceedingly hygroscopic, and they absorb water and coil up at the slightest breath; then uncoiling as soon as the moisture dries, they jostle each other about. The purpose of this mechanism is to scatter the spores gradually from the sporangia at maturity. The second type of *Equisetum* grows on banks with stiff, jointed, rush-like, often clustered stems surrounded at the joints by a light-colored sheath. These also bear cones in late spring similar to those of the field-horsetail. These plants are sometimes called «scouring-rushes,» from the fact that their roughness caused by silica in the epidermis led to their use for scouring floors and woodenware.

III. **Lycopodinæ.** A. *Isoetaceæ*.— This order likewise contains a single genus (*Isoetes*) and family. The plants are aquatic, either growing submerged or on the shores of ponds and rivers. They consist of a short fleshy base, bearing a cluster of leaves which are broadened at the base and contain an axillary sporangium, and end in awl-like joints. The position of the order is problematical, as these obscure plants seem to show unexpected affinities with several other groups. They are eusporangiate and produce spores of two sorts.

B. *Lycopodiaceæ*.— This order contains the ground-pines or club-mosses and the selaginellas or little club-mosses, which are alike in producing their spores in the axils of leaves, but differ in the spore-characters. The club-mosses (*Lycopodium*) have yellow dust-like spores, which are used commercially under the name of lycopodium powder for the relief of chafing and for producing flash-lights, since they contain a large amount of oil and are highly inflammable. The lycopods are familiar as Christmas greens, but are rarely seen in cultivation. Over 100 species are known of which at least 12 are found within the limits of the United States.

C. *Selaginellaceæ.*— This order, whose sole extant representatives belong to the genus Selaginella, is distinguished from all extant Lycopodaceæ by the possession of two kinds of spores — *microspores,* from which develop the male prothalli, and *macrospores,* from which develop the female prothalli. *Selaginella* is frequent in cultivation, some of the species being exceedingly delicate and graceful; but most of our native species are inconspicuous and little known. The «resurrection-plant» has already been mentioned. Some of the tropical species attain enormous size as climbing-plants. Over 600 species have been described, of which at least 12 are found in the United States.

IV. **Psilotaceæ.**— This group of Pteridophytes, which is represented by Psilotum, a leafy epiphyte in our Southern States, used formerly to be assigned to the Lycopedinæ, but it is now recognized that its closest allies are to be found in the Spenaphyllinæ, an extinct class of Pteridophytes intermediate between the Lycopodinæ and the Equisetinæ.

Fossil Pteridophytes are abundant in the Carboniferous period, when indeed they dominated the entire terrestrial flora, assuming arboreal proportions. Equisetinæ. Lycopodinæ and Filicinæ all have their representatives. Many groups possessed two types of spores whose present relatives have but one. See PALÆOBOTANY.

Affinities.— We have already seen that the Cycadofilices form a transition between the Pteridophytes and the flowering plants. The origin of the Pteridophytes is perhaps to be sought in some such liverwort as *Anthoceras,* whose sporophyte begins to show signs of an independent existence, and in which the spore-bearing tissue gives indications of a segmentation and a superficial position.

FERONIA, fĕ-rō'nĭ-ạ, (1) An ancient Italian goddess, who presided over woods and orchards. The ancient grove, not far from Anxur (Terracina), was consecrated to her, and is very celebrated. Emancipated slaves received a cap in her temple as a badge of freedom. (2) A genus of beetles of the family *Carabidæ.* (3) A genus of plants allied to the orange.

FEROZEPUR, fē'rōz-poor, India, a town and district in the Jullundur division of the Punjab; the town is situated on the North-Western and Rajputana railways, and is about four miles from the Sutlej. It contains the largest arsenal in India and is the headquarters of an army corps. The town is an important commercial centre and has a large trade in grain. It came into British hands in 1835 and was a place of the first military importance during the Sikh wars. Pop. 49,000.

The district of the same name has an area of 4,302 square miles. Barley, wheat, millet, cotton, tobacco and other crops are raised. Cotton and wool-weaving are the only industries. The district is healthful, having a very dry climate. Pop. 958,072.

FERRAND, fa'râṅ, **Joseph,** French jurist: b. Limoges, 1827; d. 1903. In 1871–74 he served successively as prefect of Haute Savoie, Aisne, and Calvados, and in 1888 became corresponding member of the Academy of Moral and Political Sciences. He published ‘De la propriété communale en France et de sa mise en valeur’ (1859); ‘Les institutions administratives en France et à l'Etranger’ (1879); ‘La réforme municipale en France et en Italie’ (1881); ‘Les pays libres, leur organization et leur éducation d'après la législation comparée’ (1884); ‘L'Organization municipale de Paris’ (1887).

FERRAND, fĕ-räṅ, **Marie Louis,** French soldier: b. Besançon, France, 12 Oct. 1753; d. Santo Domingo, 7 Nov. 1808. He served as a volunteer in the American Revolution, was imprisoned during the French Revolution as a friend of Lafayette, but was released and placed in command of a brigade in the armies of Ardennes and Sambre-et-Meuse. He went with General Leclerc to Santo Domingo 1801, succeeding Leclerc as governor-general 1802. He was besieged by General Dessalines 1804, but withstood until the arrival of reinforcements under Admiral Missiessy, holding the eastern part of the island for several years, but, defeated at Paolo Fincado by Ramireshu, he shot himself on the battlefield.

FERRAR, Nicholas, English clergyman: b. London, 1592; d. 4 Dec. 1637. At 14 he entered the University of Cambridge. In 1612 he went abroad and studied at Leipzig and Padua, also visiting Rome. In 1618 he returned to England and busied himself with the affairs of the Virginia Company and was chosen deputy governor of the colony and was secretary of the company for some time. He was a man of ascetic temperament and formed a religious community at Little Gidding in Huntingdonshire. Close to this he established a school and free instruction was given the children by his masters. He was held in great reverence by King Charles I, who visited his society several times. In 1624 he was a member of Parliament.

FERRARA, fĕr-rä'rä, province of Italy; on the north boundary is the Po River and on the east the Adriatic Sea; area, 1,019 square miles. The low ground is marshy, but good crops are raised on the uplands. The climate is unhealthful. Ferrara was once a duchy of Italy; it was held by the House of Este as a papel fief till 1597. It became a part of the States of the Church in 1598. In 1860 it was incorporated into the kingdom of Italy. Pop. 326,447.

FERRARA, city in northern Italy, capital of the province of Ferrara, 30 miles north-northeast of Bologna, in a fertile but unhealthful plain, at a short distance from the north-branch of the Po. It is a large and well-built town, with spacious and regular streets, and is enclosed by a wall seven miles in circuit. It is defended on the west side by a citadel regularly fortified. In the middle of the city is a castle, flanked with towers and surrounded by wet ditches, which was once the residence of the dukes. Ferrara, though still retaining many traces of its former grandeur, has long been falling into decay; its pavements are overgrown with grass and the staircases and balconies of many of its noble palaces are overrun with ivy, while others are without either doors or windows. The population has also fallen to one-fourth of its former number. It has a cathedral and numerous churches, most of which contain valuable paintings, together with some interesting specimens of sculpture. There are here a public gallery of paintings, called the Palazzo del Magistrato, containing many excellent works by the leading painters of the Ferrara school, of which Dosso Dossi was one of the leaders. The city contains a university, originally founded in 1264 and after a checkered history reopened in 1815. The university library contains about 100,000 volumes and 2,000 manuscripts, the latter including some of those of Ariosto and Tasso. The house in which Ariosto was educated and that in which he lived during his latter years, and known by the names respectively of the Casa degli Ariosti and the Casa d'Ariosto, are shown to strangers. The latter is now national property and is ranked among the national monuments. Another object of interest is the cell in the Hospital of Saint Anna, in which Tasso was imprisoned. The house occupied by Guarini, the author of the Pastor Fido — the Casa Guarina — is still inhabited by the marquises of that name. Ferrara is an archbishopric; the bishopric dates from 661; its archbishopric was founded by Clement XII in 1735. Savonarola was born here in 1452. It carries on some trade in corn and other produce of the soil. There are manufactures of silk ribbons, wax candles and brazen utensils; tanneries and glass works. Pop. of the commune 95,219.

Ferrara in the course of its long history has passed through many vicissitudes and seen many changes of masters. In 1597 — to take more recent history only — it was claimed as a fief of the Holy See by Clement VIII and until 1797 was governed as part of the papal states, when it was united to the Cisalpino Republic, afterward becoming part of Napoleon's Kingdom of Italy. In 1814 it was restored to the papal states and in 1859 was incorporated into the Kingdom of Italy.

FERRARA-FLORENCE, Council of. Upon the fall of Salonika to the Turks in 1429 the Emperor John Palæologus approached Martin V, Eugene IV and the Council of Basle to secure help against the Turks and to convoke a council for the reunion of the Greek and Latin churches, as the only means of efficaciously resisting the hordes of Islam. At first it was proposed to hold the council in some seaport town of Italy; then Constantinople was suggested. The members of the Council of Basle held out for Basle or Avignon. Finally, 18 Sept. 1437 Eugene IV decided that the council would be held at Ferrara, that city being acceptable to the Greeks. The council was opened 8 Jan. 1438 by Cardinal Albergati, and the Pope attended on 27 January. Before the Greeks arrived, proclamation was made that all further action by the Council of Basle as such would be null and void. The Greeks, i.e., the emperor, with a train of archbishops, bishops and learned men (700 in all), landed at Venice 8 February and were cordially received and welcomed in the Pope's name by Ambrogio Traversari, the general of the Camaldolese. On 4 March the emperor entered Ferrara. The Greek bishops came a little later. Questions of precedence and ceremonial caused no small difficulty. For preparatory discussions on all controverted points a committee of 10 from either side was appointed. Among them were Marcus Eugenicus, of Ephesus; Bessarion, of Nicæa; Balsamon, Livopolis and others, for the Greeks; while Cardinals Giuliano Cesarini and Nicolò Albergati, Giovanni Turrecremata and others represented the Latins. The Greek emperor at first prevented a discussion on the Procession of the Holy Spirit and on the use of leavened bread. For months the only thing discussed or written about was the ecclesiastical teaching of purgatory. The uncertainty of the Greeks on this head was the cause of the delay. The emperor's object was to bring about a general union without any concessions on the part of the Greeks in matters of doctrine. Everybody deplored the delay, and a few of the Greeks, among them Eugenicus, attempted to depart secretly, but they were obliged to return. The sessions began 8 October, and from the opening of the third session the question of the Procession of the Holy Spirit was before the council constantly. Twelve sessions were devoted to this controversy. On both sides many saw no hope of an agreement, and once more many Greeks were eager to return home. Finally the emperor permitted his followers to proceed to the discussion of the orthodoxy of the «Filioque.» In the meantime the people of Florence had invited the Pope to accept for himself and the council the hospitality of their city, hoping in this way to reap great financial profit. The offer was accompanied by a large gift of money. Eugene IV, already at a loss for funds and obliged to furnish hospitality and money to the Greeks, gladly accepted the hospitality of the Florentines. The Greeks on their part agreed to the change. The council thus quitted Ferrara without having accomplished anything, principally because the emperor and Eugenicus did not wish to reach an agreement nor compromise in matters of doctrine. Consult Hefele, 'Konziliengeschichte' (2d ed.) and Cecconi, 'Studi storici sul concilio di Firenze' (Florence 1869).

FERRARI, fĕr-rä'rē, **Benedetto** (also known as «Della Tiorba»), Italian poet: b. Reggio 1597; d. 1681. He received his education at Rome. In 1637 he wrote the libretto of the opera 'Andromeda,' which was the first opera produced publicly, a public performance being given at the author's expense at the San Casiano Theatre, Venice.

FERRARI, Ettore, Italian sculptor: b. Rome, 1849. He was educated at the Academy of Saint Luke and subsequently was appointed to a professorship there. He soon established his reputation as one of the great sculptors of his day. His principal works are a statue of Ovid, statue of Giordano Bruno at Rome, equestrian statue of Victor Emmanuel at Venice, figure of Latium on the Victor Emmanuel Monument at Rome, a bronze lyre on Shelley's grave, Rome. He is a commander of the Crown of Italy.

FERRARI, Gaudenzio, Italian painter: b. Valduggia, Piedmont, about 1480; d. Milan, 31 Jan. 1546. A scholar of Stefano Scotto, he also caught some inspiration from Perugino and Raphael. The chief characteristics of his style are correct and vigorous delineation, strong but often hard coloring, considerable power of invention and skill in the arrangement of drapery. He lived and worked in Varallo, Vercelli and Milan, and executed innumerable paintings both in fresco and in oil, the greater part of which are possessed by the Piedmont and Lombard galleries. A few specimens of his work are in England in private galleries. The London and the Berlin National Gallery, as well as the Paris Louvre, possess one example each of his oil paintings on wood. Some of his drawings are to be found in the galleries of Berlin, Dresden, Florence, London, Milan, Munich, Turin and Venice. His most comprehensive work, the frescoes at Varallo, in Piedmont, represents the passion; another good specimen of his work, the ‘Martyrdom of Saint Catharine,’ in oil on wood, painted about 1545, is in the Brera Gallery at Milan. The chief of his pupils was G. B. della Ceroa. Consult Caccia, ‘Il Sacro Monte di Varallo’ (Novara 1565); Colombo, G., ‘Vita e Opere di Gaudenzio Ferrari’ (Turin 1881); id, ‘Documenti e Notizie Intorno gli Artisti Vercellese’ (Vercelli 1883); Crowe, J. A., and Cavaceselle, G. V., ‘History of Painting in North Italy’ (Vol. I, London 1871); Halsey, E., ‘Gaudenzio Ferrari’ (London 1904); Lomazzo, G. P., ‘Idea del Tempio della Pittura’ (Milian 1584); id., ‘Trattate dell' Arte della Pittura, etc.’ (Milan 1590 and 1844); Pauli, G., ‘Gaudenzio Ferrari’ (in Thieme-Becker, ‘Künstler Lexikon,’ Vol. XI, Leipzig 1915); Pianezza and Bordiga, ‘Le Opere di Gaudenzio Ferrari’ (Milan 1835); Ouroussov, ‘Gaudenzio Ferrari à Varallo et Saronno’ (Paris 1904).

FERRARI, Giuseppe, Italian philosopher and historian: b. Milan, Italy, 7 March 1812; d. Rome, 1 July 1876. He was graduated at the University of Pavia in 1831 and became a follower of the philosophical ideas of Romagnosi and Vico. In 1835 he brought out a complete edition of the latter's works, ‘Opere di G. B. Vico’ (6 vols., Milan). Soon after this he went to Paris where he published in French ‘Vico et l'Italic’ (Paris 1839); ‘La Nouvelle Religion de Campanella’ (Paris 1840); ‘La Théorie de l'Erreur’ (Paris 1840). In 1840 he was given a doctor's degree by the Sorbonne and was made professor of philosophy at the University of Rocheford. His liberal views, however, in a short time brought about his dismissal, a condition which resulted also soon after his appointment to the chair of philosophy at the University of Strassburg in 1842. A third professorship at Bourges was also of short duration. Finally, in 1859, he returned to Italy and became professor of philosophy successively at the universities of Turin, Milan and Rome. In politics he was a radical and strongly opposed to Cavour and the monarchial idea. For some years he was a member of the Chamber of Deputies. He also served on the council of education and, in 1876, was made a senator. Besides works already mentioned his writings include ‘Idées sur la Politique de Platon et d'Aristote’ (Paris 1842); ‘Machiavel Juge des Révolutions de nôtre Temps’ (Paris 1849); ‘La Federazione Repubblicana’ (Capolago 1851); ‘La Filosofia della Rivoluzione’ (Capolago 1851); ‘L'Italia dopo il Colpo di Stato’ (Capolago 1852); ‘Histoire des Révolutions d'Italie, ou Guelfes et Gibelins’ (3 vols., Paris 1858; Milan 1871–73); ‘Histoire de la Raison d'État’ (1860); L'Annexion des Deux-Siciles’ (1860); ‘Corso sugli Scrittori Politici Italiani’ (1862–63); ‘Teoria dei Periodi Politici’ (1874). Consult Mazzoleni, A., ‘Giuseppe Ferrari’ (Milan 1876); Uberweg, F., ‘History of Philosophy’ (Vol. II, New York, new ed., 1902); Werner, C., ‘Die Italienische Philosophie des 19. Jahrhunderts’ (Vol. III, Vienna 1885).

FERRARI, Paolo, Italian dramatist: b. Modena, 5 April 1822; d. Milan, 9 March 1889. He studied law, but became interested in history and literature. As a result he began writing and in 1847 produced his first comedy, ‘Bartolommeo il Calzolajo,’ later called ‘Il Codicillo dello zio Venanzio.’ Of his many later works, ‘Goldoni e le Sue Sedici Commedie (1852), and ‘Parini e la Satira’ (1857) rank as the finest examples of modern Italian comedy, and are distinguished — as, indeed, are most of his plays — by a piquancy and sparkling dialogue, as well as cleverness of construction and occasional sharp contrasts, such as have been mostly identified with French comedy. A collection of his ‘Opere drammatiche’ was published at Milan in 14 volumes (1877–80). In 1860 he became professor of history at Modena, and afterward in the Academy at Milan. Consult Anon., ‘Paolo Ferrari’ (in *Saturday Review*, Vol. LXVII, p. 310, London 1889); Ferrari, V., ‘Paolo Ferrari, la Vita, il Teatro’ (Milan 1899); Fortis, L., ‘Paolo Ferrari, Ricordi e Note’ (Milan 1889).

FERRARI-FONTANA, Edoardo, Italian tenor: b. Rome, 1878. He entered the medical profession, but abandoned it in 1902 for the diplomatic service, becoming secretary to the Italian consul at Montevideo, Uruguay. While in the South American city he studied music and made his début in light opera. He returned to Italy in 1906 and entered on a long period of success. At Turin, on 2 March 1910 he made his début in grand opera as Tristan. His appearance was due to the illness of the principal tenor. His success was immense and he became one of the greatest interpreters of Wagnerian rôles. He has since appeared in Rome, Naples, Milan, Bologna and Buenos Aires. In 1912 he married the contralto Margarete Matzenauer. He created the rôle of Avito in ‘Amore dei tre re’ at Milan in 1913. He was subsequently engaged by the Boston Opera Company and has appeared in New York, where he became a prime favorite.

FERRARIS, fĕr-rä′rēs, **Carlo Francesco,** Italian political economist and statistician: b. Moncalvo, Alessandria, Italy, 15 Aug. 1850. In 1878 he was appointed professor extraordinary in the University of Pavia and in 1885 professor of statistics at Padua. He was a member of the Italian Chamber of Deputies in 1886–87. Among his works are ‘La Statistica e la Scienza delle Amministrazione nelle facultà

Giuridiche' (1878); 'Moneta e Corso Forzoso' (1879); 'Saggi di Economia Statistica e Scienze delle Amministrazione' (1880); 'La Statistica del Movimento dei Metalli Preziosi fra l'Italia e l'Estero' (1883); 'L'assicurazione obbligatoria e la risponsibilita dei Padroni, ed imprenditori' per gli sufortuni sul lavoro' (1890); 'Principii di scienza bancaria' (1892); 'Di alcuni caratteri internazionali dell' instruzione superiore' (1911).

FERRARIS, Galileo, Italian physicist and electrician: b. Livorno, Piedmont, 31 Oct. 1847; d. Turin, 7 Feb. 1897. He was graduated at the University of Turin in 1867 and in 1869 in civil engineering at the Royal School of Engineering. On being appointed in 1879 professor of physics in the Industrial Museum and in the Military College at Turin, he devoted himself to the study of technical physics and was in a short time recognized as one of the foremost electricians in Europe. In 1886 he founded the electro-technical school for engineers in Turin. In 1897 he was made a senator. A monument was erected in Turin to his memory in 1903. In 1885 his investigations into the properties of various electrical transformers resulted in the discovery of the rotatory magnetic field, produced by two alternating currents with a quarter difference of phase. This discovery made possible the two-phase motor. In 1893 he published a theory of the single-phase alternating motor, and to him the present development of alternating currents must largely be credited. His works on such subjects are standard authorities, and among them must be mentioned 'Le Proprietà Cardinali degli Instrumenti Diottrici, Teoria di Gauss' (Turin 1877, Leipzig 1879); 'Sulla Illuminazione Elettrica' (Turin 1879); 'Sulle Differenze di Fase delle Correnti; sul Ritardo dell' Induzione e sulla Dissipazione di Energia nei Trasformatori, etc.' (Turin 1888); 'Lezioni di Elettrotecnica' (Turin 1898, translated into German as 'Wissenschaftliche Grundlagen der Elektrotechnik,' Leipzig 1901). His complete works were published as 'Opere di Galileo Ferraris' (3 vols., Milan 1902–04). Consult 'In Memoria di G. Ferraris' (in *Rivista Tecnica,* Vol. III, p. 257, Turin 1903).

FERRATA, Domenico, Italian prelate: b. Gradoli, 1847; d. Rome, 1914. He received his education at Orvieto and in 1885 was consecrated bishop of Thessalonica *in partibus infidelium* and was appointed Nuncio to Belgium and subsequently to France. He was created cardinal 22 June 1896 with the titular church of S. Prisca. His term of Nuncio at Paris was marked by the objections lodged against him at Rome by the government leaders of Austria and Hungary who complained that he favored France over much. He subsequently was chief of the Congregation of the Sacraments and member of other congregations. In 1913 he presided over the Eucharistic Congress at Malta and in the following year, on the election of Cardinal Della Chiesa to the Papal throne as Benedict XV, Ferrari became Papal Secretary of State.

FERRATE, fĕr′-āt, in chemistry, a salt resulting from the union of some base with ferric acid (H_2FeO_4), the latter a compound of hydrogen, oxygen and iron which has never been produced by itself. See IRON.

FERRAZZI, fĕr rät′sē, **Giuseppe Jacopo,** Italian author: b. Cartigliano, Italy, 20 March 1813; d. Bassano, Italy, 3 May 1887. He studied theology at Vicenza and then taught at Bassano. As a result of his freely expressed patriotic sentiments he was deprived of this position by the Austrians, then ruling part of Italy. After the latter country's unification he was made a professor at Bassano. He published 'Di Bassano e dei Bassanesi Illustri' (Bassano 1847); 'Della Poesia Pastorale, etc.' (Bassano 1849); 'Manuale Dantesco' (5 vols., Bassano 1865–77); 'Bibliografia Petrarchesca' (Bassano 1877); 'Studi Biografici, Critici, Bibliografici su Torquato Tasso, etc.' (Bassano 1880); 'Bibliografia Ariostesca' (Bassano 1881). He also translated with comments the works of Virgil (3 vols., Bassano 1853–55). Consult Brentari, O., 'Della Vita e degli Scritti dell' Ab. Prof. Comm. G. J. Ferrazzi' (Bassano 1887); Vaccari, G., 'G. J. Ferrazzi' (in *Museo Civico di Bassano Boll.,* Vol. X, Nos. 3 and 4, Bassano 1913).

FERREE, James Barr, American architect and art critic: b. Philadelphia, Pa. He was graduated from the University of Pennsylvania 1884. He was the president of the department of architecture in the Brooklyn Institute of Arts and Sciences; is a member of several American and foreign architectural societies, and has written many professional papers for leading architectural and other periodicals. From 1902–08 he edited 'American Homes and Gardens.' He has published 'Pennsylvania: A Primer' (New York 1904); 'American Estates and Gardens' (New York 1906); 'The Bombardment of Reims' (New York 1917). He also edited 'The United States and the War; Addresses by J. M. Beck, etc.' (New York 1916).

FERREIRA, fĕr-rā′ĭ-rä, **Antonio,** Portuguese poet: b. Lisbon, Portugal, 1528; d. there, 29 Nov. 1569. He studied law and classic literature at the University of Columbia. Later he held a professorship at his alma mater, and subsequently became judge of the supreme court at Lisbon. During his leisure he composed sonnets, odes and epigrams, which earned for him the title of the «Portuguese Horace.» His high literary reputation, however, is due to his 'Epistles' and the tragedy of 'Inez de Castro' (Lisbon 1587), the second regular tragedy produced in Europe. The subject is a popular Portuguese legend; and the play is modeled upon the Greek tragic drama. It has been translated into English by Musgrave (London 1825), into German (1782) and into French (1835). He also wrote two comedies, 'Comedia do Bristo' and 'Comedia do Cioso,' which have been published together with the comedies of Sá de Miranda (q.v.) at Lisbon (1622). There is also an English translation of the second of these by Musgrave (London 1835). His poems, 'Poemas Lusitanos' were brought out by his son, M. L. Ferreira (Lisbon 1598). His complete works have been collected in two volumes (Lisbon 1771, 1829, 1875; Paris 1865). One of his best sonnets has been translated into English by John Masefield under the title 'Sonnet on the Death of his Wife' (in 'Philip the King, etc.,' London 1914). Consult Castilho, J. de, 'Antonio Ferreira, Poeta Quinhentista' (3 vols., Rio 1865).

FERREIRA DE VASCONCELLOS, dā vas″kon-sel'ōsh, **Jorge,** Portuguese dramatist: b. Coimbra or Montemor o Velho; d. 1585. His prose comedies, 'Eufrosina' (written 1527; printed Coimbra 1560); 'Ulyssipo' (written 1547; printed Coimbra 1616); 'Aulegraphia' (printed Coimbra 1619), are strictly national, and are valuable both philologically and for the proverbs in which they abound. He wrote also, in 1554, a romance of chivalry 'Triumpho de Sagramor' (Coimbra 1567; Lisbon 1867).

FERREIRO, fĕr-rā'ī-rō, a Brazilian tree-frog (q.v.).

FERREL, William, American meteorologist: b. Bedford County, now Fulton County, Pa., 29 Jan. 1817; d. Maywood, Kansas, 18 Sept. 1891. He was graduated at Bethany College, Virginia, in 1844, and early attracted attention by his researches in meteorology, of which science he was the first to propound the fundamental principles. From 1844 to 1857 he taught school in Missouri and Tennessee. In the latter year he went, by invitation of the publisher of the 'American Ephemeris and Nautical Almanac,' to Cambridge, Mass., and became associated in taking part in making the computations for this work. In 1867 he was appoined to the United States Coast and Geodetic Survey. From 1882 to 1886 he was an assistant in the Signal Service Bureau, and the maxima and minima tide-predicting machine which he invented has been used for many years in government coast surveys. After his resignation from public service, he moved to Kansas to live with his brothers and sisters. His official bibliography, published by the National Academy of Science, of which as well as of many other domestic and foreign scientific societies he was a member, contains 109 separate publications from his pen. By far the largest number of these were published in scientific journals and in the official reports of the various governmental departments with which he was connected. Of his larger works there were published in bookform 'Tidal Researches' (Washington 1874); 'Meteorological Researches for the Use of the Coast Pilot' (3 parts, Washington 1877–82); 'Popular Treatise on the Winds, etc.' (New York 1889). Consult Abbe, C., 'Memoirs of J. H. Lane and W. Ferrel' (Washington 1892).

FERRER (Y GUARDIA), Francisco, Spanish revolutionist: b. Allela, near Barcelona, 1859; executed Barcelona, 13 Oct. 1909. He went to work in Barcelona when he was 13, and it is recorded that he "soon became a free thinker." He was a railway employee from 1877 to 1885, and in the latter year he took part in the Catalonian rebellion. After that he went to Paris, where he acted as secretary to Ruiz Zorrilla, former president of the Spanish Republic, became a teacher of the Spanish language, inherited about $150,000 from one of his pupils, and formed a friendship with the radical Senator Nacquet. In 1901 he returned to Barcelona and established his "Modern School," which was both anarchistic and anti-religious. In 1906 he was accused of complicity in the attempted assassination of the king and queen of Spain, but was acquitted. He went to England in 1909, but when word came of the Riff rising he hurriedly returned to Spain, and was accused of being a leader in the movement to seize Barcelona and set up a provisional, republican and anti-Catholic state. He was arrested, tried, found guilty and shot. His death created great feeling abroad against Spain and Catholicism and a ministerial crisis resulted. Consult McCabe, 'Martyrdom of Ferrer' (New York (1909); 'Origins and Ideals of the Modern School (New York 1911); and Archer, 'Life, Trial and Death of Ferrer' (1911).

FERRERAS, fĕr-rā'ras, **Juan de,** Spanish historian: b. Labañeza, Spain, 18 June 1652; d. 8 June 1735. He was a scholarly priest, confessor of Cardinal Porto Carrero, and a member of the Spanish Academy since its foundation. He contributed to its great dictionary. His careful 'Historia de España' (18 vols., Madrid 1700–16), is authoritative for the period prior to 1598. It has been translated into French (10 vols., Paris 1751) and into German (13 vols., Halle 1754–72). He also wrote a number of theological treatises and a volume of poems, 'Varias Poesias' (Madrid 1726). Consult Nasarre y Ferriz, 'Elogio Historico de J. de Ferreras' (Madrid 1735).

FERRERO, Guglielmo, Italian historian: b. near Naples, 1872. He is the son of a railway engineer, and was educated in the law at Pisa and in belles-lettres at the University of Bologna. He collaborated with Lombroso in 'La donna delinquente' (1893) and with Bianchi and Sighele is author of 'Il mondo criminale italiano' (1894), the preface of which is by Lombroso, whose daughter, Ginà, Ferrero married. Ferrero's socialistic outbursts caused his banishment for a few months. In the late 90's he became well known as a publicist and in 1898 lectured on militarism at Milan. His fame as a historian is founded on 'Grandezza e decadenza di Roma' (1902–08; 'Greatness and Decline of Rome,' in English 1909). Here he shows his psychological training as well as his knowledge of economics. The work has been greatly overrated. Ferrero was unable to avoid the pitfalls into which his understanding and sympathy with Lombroso's theories led him and his work bears well nigh all the faults which may possibly be drawn from the great criminologist's wrong views and conception of the part that heredity plays in our social order. Ferrero's criticisms of the Greek and Latin historians are likewise not well-founded. His ultra-radical view of things led him to adopt a strange one-sided stand on many questions. And more than once his real or pretended ultra-modernism has led him astray. Ferrero was lecturer at the Collége de France in 1906, traveled in South America in 1907 and lectured in the United States the following year. Other works by him are 'Characters and Events of Roman History' (1908); 'Fra i due mondi' (1913; English trans., 'Between Two Worlds'); 'Ancient Rome and Modern America: A Comparative Study of Morals and Manners' (1914), a rather warped view of American life.

FERRERS, fĕr'ĕrz, **Norman Macleod,** English mathematician: b. Prinknash Park, Gloucestershire, 11 Aug. 1829; d. Cambridge, England, 31 Jan. 1903. He was educated at Eton and Gonville and Caius College, Cambridge. Even during his college life he showed great interest and special talent for mathematics, being a senior wrangler in 1851. After leaving college he studied at first law, but finally took orders and became a fellow, mathematical lecturer, tutor, and, in 1880, master of his college. He took a deep interest and an active part in the affairs of his university, being a member of its council for many years, and vice-chancellor in 1884–85. In 1877 he was made a Fellow of the Royal Society of London. He also acted as editor of the *Quarterly Journal of Mathematics* from 1855 to 1891. He wrote many papers, a list of which may be found in Royal Society of London, 'Catalogue of Scientific Papers' (Cambridge 1867–1916), and edited 'The Mathematical Papers of the late George Green' (London 1871).

FERRET, a small and slender variety of the genus *Mustela,* closely allied to the polecat (q.v.), usually an albino, yellowish white, with pink eyes. It is a native of Africa, but has been introduced into Europe where it is bred chiefly as a domestic exterminator of mice and rats, and is used also in rabbit hunting. Unlike the ordinary polecat, it is exceedingly sensitive to cold, and must be well protected in northern climates which do not at all affect the polecat. Though bred in confinement, the ferret exhibits no affection, even for its master; and must be carefully secured, lest it escape and do injury. It has been known to hurt infants, and, if it gets at poultry, it will kill far more than it can eat. The female even, at times, devours her young. A cross between the ferret and the polecat is sometimes used. Consult Everitt, N., 'Ferrets' (London 1897).

FERRET, Col de, cōl de fĕ-rā, a pass in the Mont Blanc district of the Alps, in Switzerland, connecting Orsières, in the latter country, with Courmayeur, in Italy. Height 8,320 feet above sea-level. (See ALPS). Consult Ball, J., 'The Western Alps' (London 1898).

FERRETING, the sport, well known in England, of chasing rabbits or hunting vermin (rats) with trained ferrets (q.v.). To pounce upon the victim and kill («pith») it by a single bite in the neck, is regarded as a mark of high excellence in a ferret by ferreters. The principal use of ferrets, however, is not to kill the prey, but to go into their burrows and hiding places, muzzled, and drive out the animals.

FERRI, Ciro, chē'rō fĕr'rē, Italian painter, architect, and engraver: b. Rome, 1634; d. there, 13 Sept. 1689. He was a pupil and imitator of Pietro da Cortona, but displays less grace and less richness of color than his master. His canvases are scattered through Italy. He completed the frescoes in Pitti Palace, begun by Dla Cortona, and among his other paintings are the ceiling of the Annunziata and the cupola of Saint Agnese, Piazza Navona, Rome, unfinished, and especially his frescoes in S. Maria Maggiore at Bergamo. Samples of his oil painting are in a number of galleries: Corsoni Gallery, Rome, Pinakothek, Rome; Versailles, Caen Vire Ajaccio, France; Hampton Court, England; Petrograd, Warsaw, Russia; Imperial Court Museum, Lichtenstein Gallery, Harrach Gallery, Vienna, Austria; Germanic Museum, Nuremberg, Erlangen, Speyer, Darmstadt, Gotha, Oldenburg, Potsdam, Dresden, Germany. Among his architectural pieces are the altars of Chiesa Nuova and of other churches in Rome. He left a great number of etchings which are to be found especially in the Uffizi Gallery, Florence, and in the Paris Louvre and National Library. Consult Kurzwelly, J., 'Ciro Ferri' (in Thieme-Becker, 'Künstler-Lexikon,' Vol. XI, Leipzig 1915); Pascoli, L., 'Vite de' Pittori, Scultori ed Architetti Moderin' (Vol. I, p. 171, Rome 1730).

FERRI, Enrico, Italian sociologist: b. San Benedetta-Po, Mantua, 25 Feb. 1856. He was educated at Bologna, Pisa and Paris, and was admitted to the bar. He practises law at Rome, having been a member of the Chamber of Deputies since 1886, representing a socialistic following. Among his works are 'Sociologie Criminelle' (1893, English translation 1896); 'La Scuola positiva di dirrito criminale' (1883); 'Difese penali e studi di giurisprudenza' (1898); 'Deliquenti nell' arte' (1901).

FERRI, Luigi, Italian philosopher: b. Bologna, 15 June 1826; d. Rome 1895. He entered the normal school, Paris, 1847, teaching philosophy in Châlon, Evreux, Dieppe, Blois, and Toulouse 1850–55. Returning to Italy he became secretary of public instruction 1860, professor of philosophy and history at the Institute of Florence 1863, and at the University of Rome 1871. In 1885 he succeeded Mamiani as editor of the *Filosofia delle Scuole Italiane* which he renamed *Rivista Italiana di Filosofia.* His work is eclectic, showing the influence of his French and Italian teachers, amongst the latter especially Mamiani. Among his works are 'Il Genio d'Aristotele' (1866); 'Studii su Leonardo da Vinci' (1871); 'Il senso commune nella filosofia' (1872); 'Sulla dotrina psicologica dell' associazione' (1878); 'la Psicologia di Pietro Pomponazzi' (1877); and in French 'Essai sur l'histoire de la philosophie en Italie au XIXme siècle' (Paris 1869); and 'La Psychologie de l'Association depuis Hobbes jusqu'à nos jours' (Paris 1883).

FERRIC OXIDE, or SESQUIOXIDE OF IRON. See HEMATITE; IRON.

FERRICYANIDE OF POTASSIUM. See HYDROCYANIC ACID.

FERRIER, fĕr'ĭ-ĕr, **SIR David,** Scottish neurologist: b. Woodside, near Aberdeen, 1843. In 1872 he became professor of forensic medicine in King's College, London, a chair which he exchanged in 1889 for that of neuro-pathology, specially founded for him. He has gained a wide reputation by his investigations of the structure of the brain, particularly in connection with the localization of its functions. His results are stated in his works on the 'Functions of the Brain' (1876); and 'Cerebral Localization' (1878). His researches necessitated a large number of experiments on living animals, and he has, in consequence, been strongly attacked by the anti-vivisectionists. He was knighted in 1911.

FERRIER, James Frederick, Scottish philosopher: b. Edinburgh, 16 June 1808; d. 11 June 1864. In 1831 he was graduated at the University of Oxford and in 1842 became professor of civil history at Edinburgh. In 1845 he was appointed to the chair of moral philosophy and political economy in the University of Saint Andrews. He enunciated the «theory of knowing and being» in which the ego forms an essential part of every possible conception of the mind. Thus to be knowable the object must coexist with the subject. He wrote ‹Institutes of Metaphysic› (1854); ‹Lectures on Greek Philosophy and other Philosophical Remains of J. F. Ferrier› (published posthumously, 1866).

FERRIER, fār'yā', **Paul,** French dramatist: b. Montpelier, 29 March 1843. He wrote several dramas previous to 1873, when he attained his first great success with ‹Chez l'avocat› and ‹Les Incendies de Massoulard.› These were followed by other successful pieces including ‹Les Compensations› (1876); ‹Les mousquetaires au couvent› (1880); ‹Babolin› (1884); ‹Joséphine vendue par ses sœurs› (1886); ‹L'Art de tromper les femmes› (1890); ‹Calendæ› (1894); ‹Le Carillon› (1896); and the opera libretti, ‹La Marocaine› (1879), music by Offenbach; ‹Le Chevalier d'Harmental› (1896), music by A. Messager; ‹La Fille de Tabarin› (1901), with V. Sardou, music by Gabriel Pierne.›

FERRIER, Susan Edmonstone, Scottish novelist: b. Edinburgh, Scotland, 7 Sept. 1782; d. there, 5 Nov. 1854. She was an intimate friend of Sir Walter Scott and of some of the most eminent literati of her day. She wrote three novels: ‹Marriage› (1818); ‹The Inheritance› (1824); and ‹Destiny, or the Chief's Daughter› (1831), all of which appeared at first anonymously. A collected edition, corrected by the author herself, was published in six volumes in 1841, and republished in 1850, 1881 and 1894. They are vigorous and lively pictures of Scottish life and character, full of social satire and clever caricature, but exhibit a certain hardness and want of sympathy at times. They enjoyed a great popularity in their day and the first of the three, especially, was highly praised by Sir Walter Scott. Consult Douglas, Sir George, ‹The Blackwood Group› (New York 1897); Doyle, J. A., ed., ‹Memoir and Correspondence of Susan Ferrier› (London 1899); Howells, W. D., ‹Heroines of Fiction› (New York 1901); Saintsbury, G., ‹Miss Ferrier's Novels› (in *Fortnightly Review,* Vol. XXXVII, p. 314, London 1882).

FERRIÈRES, fār'ryār', France, village in the department of Seine-et-Marne, 15 miles southeast of Paris. It contains a church dating from the 13th century and a magnificent château in Renaissance style, built in 1860. The château was the headquarters of the king of Prussia from 19 Sept.–5 Oct. 1870 and here Jules Favre vainly sought to conclude an armistice with Bismarck.

FERRIS, Albert Warren, American physician: b. Brooklyn, N. Y., 3 Dec. 1856. He was graduated at the New York University 1878, and at the Columbia University College of Physicians and Surgeons 1882. He became assistant in neurology, Columbia University, 1893, and assistant in medicine in the New York University medical department 1898. He was president of New York State commission in lunacy, 1907 to 1911; and senior resident physician Glen Springs Sanitarium, Watkins, N. Y., 1912–13; superintending director for commissioners of State reservation at Saratoga Springs, N. Y., since 1913; incorporator, director and financial secretary Pringle Memorial Home for aged men, Poughkeepsie, 1899–1908; editor-in-charge medical department, ‹New International Encyclopedia› since 1901; principal medical contributor to it and to ‹International Year Book› since 1898. He is a contributor to several medical journals; department editor of *The Modern Hospital,* and is a member of several medical societies.

FERRIS, George Washington Gale, American engineer: b. Galesburg, Ill., 14 Feb. 1859; d. Pittsburgh, Pa., 22 Nov. 1896. He was graduated at Rensselaer Polytechnic Institute, Troy, N. Y., in 1881. From 1883–85 he lived in Louisville, Ky., and from then on in Pittsburgh, Pa. In 1892 he conceived the idea of a gigantic revolving wheel which, in spite of attempts of his friends to discourage him, he built successfully in Pittsburgh and erected for the World's Columbian Exposition in Chicago in 1893. The wheel could hold more than 1,000 passengers, and during the exposition it was one of the great attractions. It was named after its inventor ‹Ferris Wheel› and copies of it, modified as to size, are still used as popular attractions at fairs and pleasure parks. Consult Snyder, C., ‹Engineer Ferris and His Wheel› (in *Review of Reviews,* Vol. VIII, p. 269, New York 1893).

FERRIS, John Mason, American clergyman: b. Albany, N. Y., 1825; d. 1911. He was graduated at New York University in 1843 and subsequently studied at the New Brunswick Theological Seminary. In 1849 he was ordained to the ministry of the Dutch Reformed Church and held successive pastorates at Tarrytown, N. Y., 1851–54, Chicago 1854–62 and Grand Rapids, Mich., 1862–65. He was professor for one year at the Western Theological Seminary of Holland, Mich., and in 1865 became secretary of the Board of Foreign Missions of the Dutch Reformed Church, becoming treasurer of the board in 1886. He edited the *Christian Intelligencer* from 1881 to 1906.

FERRIS, Woodbridge Nathan, American educator and public official: b. Spencer, N. Y., 6 Jan. 1853. He was educated in the Oswego Normal and Training School and the medical department of the University of Michigan 1873–74. In 1875–76 he was principal of a business college and academy at Freeport, Ill., and in 1878–79 was principal of Dixon Business College and Academy. In 1879–84 he served as superintendent of schools of Pittsfield, Ill. In 1884 he removed to Big Rapids, Mich., where he founded Ferris Institute of which he became president. He was the Democratic candidate for Congress in 1892, and for governor of Michigan in 1904. He was elected governor for the term 1913–14, and was re-elected for the term 1915–16. His administration came in for considerable criticism as a result of the methods employed in handling the striking copper miners.

FERRO, fĕr'rō, or **HIERRO,** yĕr'rō, the most westerly of the Canary Islands, and the smallest of those which are inhabited; longitude of the western extremity, 18° 9'. It is about 18 miles long and 9 miles broad. It is a rocky, volcanic island, rising to the height of over 4,100 feet, and has numerous extinct craters, and a number of warm springs. It is by no means fertile, but good wine and brandy are made, and excellent figs are grown on the island. This island was once considered the most westerly point of the Old World, and geographers reckoned longitude from it. For this purpose the longitude of Ferro was in France taken as exactly 20° west of that of Paris, though this meridian really passes some miles to the east of the island. German geographers adhered longest to the meridian of Ferro in constructing their maps. Pop. 7,667.

FERRO-ALLOYS. See Electrochemical Industries.

FERROL, fĕr-rōl′, or **EL FERROL,** Spain, seaport in the province of La Coruña; about 12 miles northeast of the town of La Coruña; on the Bay of Betanzos, a few miles from the ocean. The bay forms one of the best natural harbors in Europe, and the narrow channel which leads to it is defended by the forts San Felipe and Palma. Charles III built here an arsenal for the Spanish navy, which is still in use and there is an extensive shipbuilding yard. The manufactures consist chiefly of military and naval equipments, linen, hardware, sail-cloth and leather. The sardine fishery is also important. Ferrol has figured in recent history, was the scene of a British repulse in 1800, and has twice (1809, 1823) been occupied by the French. Pop. 26,270.

FERROMAGNETISM. The property of being strongly attracted by a magnet, possessed by iron, steel, nickel, cobalt and certain alloys. See Magnetism.

FERRON, fā′rôn̄, **Théophile Adrien,** French general: b. Pré-Saint-Evroult, Eure-et-Loire, 1830; d. 1894. He was educated at the Ecole Polytechnique and in 1852 joined the engineers corps. He gained distinction in the campaign in the Crimea and subsequently was appointed professor of military science at the Ecole d'Application de Metz, was employed at the war office in 1880 and in 1887 became Minister of War. In 1878 he became colonel and in 1886 general of division. He has published ‘Considérations sur le système défensif de la France’ (1873); ‘Considérations sur le système défensif de Paris’ (1875); ‘Instructions sommaires sur le combat’ (1883); ‘Quelques indications pour le combat’ (1892).

FERROTYPE, or **ENERGIATYPE,** in photography, a process first made public by Robert Hunt in 1844, in which the negative was developed by a saturated solution of protosulphate of iron, with mucilage of gum-arabic, and fixed by soaking in water to which a small quantity of ammonia or hyposulphite of soda had been added. See Photography.

FERROUS SULPHATE, FERROUS COMPOUNDS. See Iron.

FERRUCCI, fĕr-roo′chē, **Andrea,** Italian sculptor: b. Fiesole, 1465; d. 1526. He studied under Francesco di Simone Ferrucci and Michele Maini and in 1512–18 superintended the work on the cathedral at Florence, for which he himself executed a statue of Saint Andrew. His greatest work is a baptismal font at Pistoia. The Fiesole cathedral possesses a marble reredos from his hand and the Bargello, Florence, has a ‘Holy Family.’ Other works of Ferrucci are the tomb of the Saliceti at Bologna, decorations in San Martino, Naples, and the Strozzi tomb in Santa Maria Novella, Florence, begun by him and finished by Casini and Boscoli. His work shows that he was a great admirer of Michelangelo. He excelled in ornamentation.

FERRY, fĕ′rē, **Gabriel,** the Younger, French author, dramatist and novelist: b. Paris, 30 May 1846. He is a son of Gabriel the Elder and employs the same pseudonym. At first he was connected with a bank, but soon followed in his father's footsteps and devoted himself to literature. He has written a number of plays, ‘Réginah’ (1874), being one of the best. His miscellaneous prose includes ‘Les dernières années d'Alexandre Dumas’ (Paris 1882); ‘Les patriotes de 1816’ (Paris 1883); ‘Les deux maris de Marthe’ (Paris 1884); ‘Balzac et ses amies’ (Paris 1888); ‘Cap de fex’ (Paris 1889); ‘Les exploits de César’ (Paris 1889); ‘Les exploits de Martin’ (Paris 1890); ‘Les pronesses de Martin Robert’ (Paris 1890) etc.

FERRY, Jules François Camille, French statesman: b. Saint Dié, France, 5 April 1832; d. Paris, 17 March 1893. He was admitted to the Paris bar in 1854, and speedily identified himself with the opponents of the empire. His hostility was carried into journalism, and a series of articles in the *Temps* (*Times*), were republished as ‘The Fantastic Tales of Haussmann’ (1868). In 1869 he was elected to the National Assembly, where he voted against the war with Prussia; and during the siege of Paris by the Germans (1870–71) he played a prominent part as central mayor of the city. He was Minister to Athens 1872–73, and in 1879 became Minister of Public Instruction and began an agitation against the Jesuits. Their expulsion was effected, and brought about the dissolution of the ministry in September 1880. M. Ferry then formed a cabinet, which remained in office till November 1881. In February 1883 he again became premier, with a policy of “colonial expansion,” involving a war in Madagascar and the invasion of Tonquin, where a minor reverse to the French troops was followed by a storm of criticism directed against the premier which caused his downfall in March 1885. On 10 Dec. 1887 he narrowly escaped assassination at the hands of a madman, one of whose shots was ultimately the cause of his death. In 1890 he was made senator, and three weeks before his death was elected president of the Senate. The Panama scandal left his reputation unscathed. He was a strong anti-clerical who in the remodeling of primary instruction, placed education on a free, non-clerical and obligatory basis. His ‘Discours et Opinions’ appeared in seven volumes (1893–98). Consult King, ‘French Political Leaders’ (New York 1882); Rambaud, ‘Jules Ferry’ (Paris 1903); Sylvin, ‘Célébrités contemporaines’ (Paris 1883).

FERRY, Orris Standford, American statesman and solider: b. Bethel, Conn., 15 Aug. 1823; d. Norwalk, Conn., 21 Nov. 1875. He was graduated at Yale in 1844. He studied law and was admitted to the bar in 1846. After filling important political places in his native State he was in 1859 elected to Congress as a Republican, and sat as one of the famous Committee of Thirty-Three appointed to consider and report upon the condition and relations of the seceded States. He was colonel of the Fifth Connecticut Volunteer Infantry (1861), and served from 1862 to the end of the war as brigadier-general of volunteers. He was elected to the United States Senate as a Republican in 1866, and re-elected in 1872.

FERRY, Thomas White, American politician: b. Mackinac, Mich., 10 June 1827; d. Grand Haven, Mich., 13 Oct. 1896. Early in life he moved with his family to Grand Haven, Mich., and was educated in its public schools, entering business there. He served in the State legislature and from 1865 to 1871 was a Republican member of Congress. He was elected to the United States Senate and served from 1871 to 1883. On the death of Henry Wilson he became acting Vice-President of the United States and president of the Senate pro tempore from 1875 to 1877. He presided over the high court of impeachment of Secretary of War Belknap and over the 16 joint meetings of the two houses of Congress during the Hayes-Tilden contest. After the end of his term as acting Vice-President he was re-elected president of the Senate pro tempore in 1877, 1878 and 1879.

FERRY, a franchise or right to maintain a boat upon a river or other body of water and carry people, animals, vehicles and other property between certain places for a reasonable toll. It is considered to be in the nature of a public highway over the water, and the franchise can only be acquired by legislative authority, either directly, as by a special act, or indirectly, through courts, municipalities, counties, commissioners or other subordinate bodies acting under powers conferred by the legislature. The grant by which the franchise is given usually specifies certain conditions as to time, service, etc., and whether the privilege is exclusive within certain limits or not. Either an individual or a corporation may hold this franchise, and preference is given to riparian owners. A ferryman is a common carrier, subject to the same duties and liabilities.

Ferry-Boats.— Steam vessels are now employed for carrying passengers and vehicles for short distances across rivers, lakes and straits. On narrow rivers, ferries are frequently operated by means of a chain, lying along the bottom of the river, secured at both ends and passing over a drum on board the ferry-boat, the drum being revolved by the engine, or in small boats, by hand. This method is particularly suitable for working in foggy weather, or where there is a strong current. Another type of ferry-boat, used on the Rhine and elsewhere, is moved across by the combined efforts of the current and the pull exerted by a long moving chain which is fixed upstream. By directing the bow upstream, the pressure of the current against the side of the boat causes it to cross from one side to the other. The large ferry-boat for passenger traffic is now usually a screw-vessel having a screw at either end, it having been found that greater speed and more room could thus be obtained than with paddle-wheels. These vessels are found in large numbers in New York harbor where thousands of people are transported across the rivers and bay every day. There are also many large paddle-vessels, this type being usually selected for small or medium-sized ferry-boats. Large vessels are employed for conveying railway trains in places where it is impracticable or undesirable to construct bridges. These vessels are almost exclusively paddle-steamers, owing to the greater facility which they possess for stopping and reversing when being brought into position for running the trains on board. Vessels of this type plied on Lake Baikal before the opening of the circum-Baikal section of the Trans-Siberian Railroad. They are also employed at San Francisco and New York and on Lake Michigan.

FERRYLAND, Newfoundland, the capital of a district of the same name, 35 miles south of Saint Johns. It has a good harbor with a lighthouse. Sir George Calvert, afterward Lord Baltimore, founded a settlement here named Avalon. There exist remains of an old fort. Pop. 600.

FERSEN, fĕr'sĕn, **Fredrik Axel von,** Swedish statesman: b. Stockholm, 1719; d. 1794. He was descended from a Scottish family named McPherson, entered the Swedish Life Guards in 1740 and from 1743 to 1748 was in the French army, in which he rose to the rank of brigadier-general. He was in the Swedish service in the Seven Years' War in which he won signal successes over the Prussians. He became field marshal in 1770. His later years were occupied with politics: he was one of the leaders of the «Hats» and for several years obstructed the measures of Gustavus III, whom he treated with colossal insolence. He was arrested in 1789 and thereafter remained aloof from politics. His ‘Historiska Skrifter’ is mainly autobiographical, but its historical accounts are often biased. Consult Bain, R. N., ‘Gustavus III’ (London 1895).

FERSEN, Hans Axel, Count von, Swedish military officer and diplomat: b. Stockholm, Sweden, 4 Sept. 1755; d. there, 20 June 1810. He came to America in 1780 on the staff of Rochambeau; fought under Lafayette and received from Washington the Order of the Society of the Cincinnati. Later he returned to Paris where he had already been stationed in 1778–80; he became a favorite at court, and was the disguised coachman at the flight of the royal family from Versailles during the Revolution. He was deeply devoted to Queen Marie Antoinette and made a number of unsuccessful attempts to save her. His relations with her have been the subject of a number of books. He returned to Sweden, where he was received with honor, and in 1801 was made grand marshal of that country. He was entrusted with a number of important diplomatic missions. On suspicion of complicity in the death of Prince Christian of Sweden he was seized by a mob while marshaling the funeral procession, and beaten to death. After his brutal assassination his entire innocence was clearly established. Consult Carnegy, M., ‘A Queen's Knight; the Life of Count Axel de Fersen’ (London 1912); Fersen, Comte J. A. de, ‘The French Army in the Revolutionary War’ (in *Magazine of American History,* Vol. XXV, pp. 55 and 156, New York 1891); Gaulot, P., ‘Un Ami de la Reine’ (Paris 1894; translated into English as ‘A Friend of the Queen’ by C. Hoey, 2 vols., London 1894); Granath, W., ‘Fersenska Mordet. Historisk Roman’ (Stockholm 1904); Hansson, O., ‘L'Assassinat de Fersen’ (in *Revue d'Histoire Diplomatique,* Vol. XXV, p. 195, Paris 1911); Heidenstam, O. G. de, ‘Marie-Antoinette, Fersen et Barnave; leur Correspondance’ (Paris 1913); Klinckowström, R. M. de, ed., ‘Le Comte de Fersen et la Cour de France’ (2 vols., Paris 1878); O'Connor, T. P. ‘Some Old Love Stories’ (London 1895).

FERTILIZATION. See Embryology.

FERTILIZATION OF FLOWERS BY INSECTS. See POLLINATION.

FERTILIZATION OF THE OVUM. See EMBRYOLOGY.

FERTILIZATION IN PLANTS. Fertilization is generally defined as the union of definitely organized male and female elements. This definition is strictly correct for plants in which the uniting elements can be called sperms and eggs; but in many of the lower plants — algae and fungi — the elements which unite are alike in size and appearance, not being differentiated as male and female. Many botanists use the term conjugation to describe the union of such similar gametes, as the uniting elements are called. Between these cases in which the gametes are alike and those in which they are very different, there are all imaginable gradations. However, in all cases, the essential feature is the union of the two nuclei of the gametes, whether the gametes be alike or unlike. It is still quite generally believed that the two nuclei fuse in the resting condition and that the chromatin of the two parents becomes mixed. A thorough cytological study of fertilization has been made in only a few plants, and in most of these the chromatin — at the time of fertilization — is in the form of separate chromosomes. (See CHROMOSOME). There is no doubt that the chromosomes of the male and female, in these cases, are entirely separated and that the first division of the egg takes place without any fusion or even close association of chromosomes. The two nuclei resulting from the first division of the egg pass into the resting condition and the chromatin of the male and female parents becomes indistinguishable. During all the rest of the life history no one has yet been able to identify the male and female chromosomes; but there is such strong evidence that the chromosome is an individual organ of the cell, maintaining its identity throughout the life history, that most cytologists believe there is never any real fusion of male and female chromosomes, although there is a very close contact.

Fertilization serves two purposes: it acts as a stimulus to development and it keeps the characters of the species approximately constant. As a result of the stimulus, the fertilized egg divides repeatedly and builds up the embryo. There seems to be a limit to the duration of the stimulus and, when that limit is reached, the organism grows old and dies, but, as it reaches maturity, it produces eggs, which, stimulated by fertilization, begin the process again. That fertilization functions in keeping the species approximately constant is generally admitted. Variation is universal and no two individuals are exactly alike. If an individual varies widely from the type, we generally call it a freak or sport. Such freaks or sports are either incapable of fertilization and consequently leave no progeny, or they are fertilized by some individual of the species which has not varied much, and the union with a normal individual reduces the aberrant form to the ordinary plane of the species. A perennial illustration is the six-fingered man, an obvious freak. Intermarriage with normal individuals for generation after generation finally breeded the six-fingered condition out of the family. Doubtless, plants behave in the same way. Variations which maintain themselves and stubbornly refuse to be reduced to the type are called *mutations* (q.v.) It is very probable that many «species» have arisen in this way. Consult Wilson, E. B., ‘The Cell in Development and Inheritance’; Mottier, D. M., ‘Fecundation in Plants’ (Carnegie Inst. of Washington. Publication No. 15).

CHARLES J. CHAMBERLAIN.

FERTILIZERS. Any substance applied to the soil to aid the growth of plants may properly be called a fertilizer. The name has, however, become associated with a class of materials manufactured and sold for this purpose, the handling of which now constitutes an important industry.

The constituents of the plant that it derives from the soil are nitrogen. phosphorus, sulphur, potassium, sodium, calcium, magnesium, iron, aluminum, manganese, silicon, chlorine. Of these nitrogen, phosphorus or phosphoric acid, and potassium or potash, are the substances most likely to be deficient in the soil and therefore the ones that are contained in fertilizers. A fertilizer may contain any one or more of these substances.

The chief distinction between the functions of farm manure and commercial fertilizers may be stated in a general way to be that farm manure increases crop production by improving the condition of the soil, as well as by furnishing plant nutrients, while commercial fertilizers may act directly as a plant-food material without materially affecting soil structure.

It is evident, therefore, that commercial fertilizers are not an adequate substitute for farm manure or green manures for producing permanent improvement. Their function consists in supplementing the available supply of plant-food in a soil which may be deficient in any one or more of the substances usually contained in fertilizers. On virgin soils commercial fertilizers are usually superfluous; but as loss of plant-food goes on under cropping, restitution must be made and, as this is usually not adequately done with farm manure, fertilizers are finally called upon.

Where there is large loss of plant-food from soil constituents due to leaching, there must be a large excess of potential fertility, in order that the growing crop shall at all times be supplied with available plant-food. A deficiency in any constituent will check growth by compelling the plant to depend upon a less readily available supply. Commercial fertilizers are useful by presenting readily available food to the plant when it is beginning growth and when a deficiency in the supply is likely to produce a permanent injury.

As the price of land increases, as the cost of labor becomes greater and as the value of the crop augments it becomes more important that maximum crops shall be raised, and for these reasons commercial fertilizers usually have greatest sale where agriculture is most intensive. There are also many special crops requiring more of one plant-food element than of another, and the needs of these can best be met by the use of commercial fertilizers.

Historical.— The value of animal excrements applied to soils on which crops were grown has been appreciated by the husbandman as far back as records go. Why this manure is beneficial; and what relation its constituents bear to those of plants, are matters which have only been worked out during the last century, and knowledge of which has led to the use of fertilizers composed of mineral salts, commonly known as commercial fertilizers.

The earliest record of the use of artificial manures for increasing the yield of crops is contained in a book entitled 'A Discourse Concerning the Vegetation of Plants.' The title page also contains the following announcements: "Spoken by Sir Kenelm Digby, at Gresham College, on the 23d of January 1660." The author advocates the use of saltpetre to increase the yield of crops, and says: "By the help of plain saltpetre, dilated in water and mingled with some other fit earthly substance, that may familiarize it a little with the corn into which I endeavored to introduce it, I have made the barrenest ground far outgo the richest, in giving a prodigiously plentiful harvest." His dissertation does not, however, show any true conception of the reason for the increase in the crop through the use of this fertilizer. The almost total absence of any knowledge of the composition of plants, and the crude state of chemistry at that time, made this quite impossible.

It was not until 1804 that any light was thrown upon the subject. In that year was published 'Recherches Chimique sur la Végétation' by Theodore de Saussure. This brilliant French investigator was the first to appreciate the significance of the ash ingredients of plants; to point out that without them plant life was impossible, and to show that only the ash of the plant was derived from the soil.

Justus von Liebig is commonly regarded as having laid the foundation upon which the commercial fertilizer industry has been built. Certainly his reports to the British Association in 1840 and again in 1842 made the British agriculturists regard as they never had done before the importance of a sufficient supply of certain readily soluble mineral substances in the soil. He supported the contention of De Saussure regarding the importance of mineral matter in the plant, and its extraction from the soil. He refuted the theory, at that time popular, that plants absorbed their carbon from humus, but made the mistake of attaching little importance to the presence of humus in the soil. He showed the importance of potash and phosphates in manures, and in his earlier writings spoke of the value of nitrogen for fertilizing crops, but afterward made the mistake of denying the usefulness of nitrogenous manures for plants, holding that the ammonia washed down by rain affords a sufficient supply.

By the middle of the 19th century it was well understood that potash, phosphoric acid and nitrogen were valuable constituents of fertilizers, and that the other mineral elements of plant-food, with the occasional exception of calcium, were always present in sufficient quantity in arable soils. It has since been shown that the family of plants known as the *Leguminosæ* have the ability to secure a large part, at least, of their nitrogen from the air, and that as these plants are very rich in nitrogen they leave a supply of nitrogen in organic matter in the soil when plowed under.

Complete and Incomplete Fertilizers.— Fertilizers, containing nitrogen, phosphoric acid and potash, mixed together so that an application of the preparation will result in bringing each of these substances in contact with the soil wherever applied, are called complete fertilizers. The proportions in which the constituents are mixed vary with the different brands and factories. Sometimes a fertilizer of this kind will be advertised for use on a certain crop, and will contain the nitrogen, phosphoric acid and potash in the proportion in which the manufacturer believes they will produce the best yields of that crop. He has, however, no means of knowing the requirements of the soils on which the fertilizer is to be used.

Incomplete fertilizers contain only one or two of the customary fertilizer ingredients.

Available and Unavailable Fertilizer Material.— The fertilizing constituents in a fertilizer may be present in a readily soluble or difficultly soluble condition, depending upon the chemical combinations and, to some extent, upon the physical condition in which they are found. Thus phosphoric acid when in the form of phosphate rock as it is taken from the deposits is a very difficultly soluble substance, and plants can avail themselves of it only in small quantities. After the same rock has been treated with sulphuric acid the phosphoric acid is in a form in which it can be readily used by plants. To a more limited extent the same is true of the phosphoric acid in basic slag, which, when the slag is in an unground condition, is not of much use to plants, but when the slag has been finely ground furnishes a valuable form of plant-food.

When the fertilizing material is in a condition in which it can be readily used by the plant it is said to be "available," and when it can be used only with great difficulty it is said to be "unavailable." It is important that the purchaser should know in what form the constituents are present in a fertilizer.

Nitrogenous Fertilizers.— Nitrogen is absorbed by most plants only in the form of a soluble salt; hence for the cereals and many other crops it is desirable either to have it in this form or to incorporate it in the soil in a condition in which it will be readily converted into a soluble condition. Plants like the clovers, alfalfa, peas, beans, etc., have the power of using the nitrogen of the air, and hence do not require nitrogenous fertilizers in such large amounts. These plants may be used to increase the supply of nitrogen in the soil. Nitrogen is the most expensive constituent of fertilizers, and is extremely important, as it is used in large amounts by plants and is likely to be deficient in soils. The form in which nitrogen is present in a fertilizer may make a great difference in its value and in the way in which it can be best applied. Nitrogenous fertilizers differ in having their nitrogen either in the form of a soluble salt or combined as organic material.

Nitrate of Soda.— This now constitutes one of the principal sources of inorganic nitrogen in artificial manures, having largely taken the place of Peruvian guano, which was used for many years, and the profitable use of which did much to promote the extensive use of commercial fertilizers. The salt occurs in the crude condition called caliche, in enormous deposits, principally in the province of Tarapaca in northern Chile. The earlier records of these deposits extend back to 1820, but it was not until several years later that they were exploited. The portion of the country in which the deposits lie is a sandy desert where rain never falls. The altitude is 3,000 to 4,000 feet above the sea-level. The deposits have been attributed to the action of minute organisms fixing in the soil, through countless ages, the nitrogen of the atmosphere, and leaving the product finally in the form of sodium nitrate that has crystallized out of solution in which it has at some time been held. Several other theories have been advanced but no wholly adequate explanation has yet been offered.

The raw product is found beneath a covering consisting of two layers, the upper one of sand and gypsum and the lower of baked clay and gravel. The thickness of the caliche varies from a few inches to 12 feet. It is extracted by boring through the upper layers and introducing a charge of blasting-powder, which, when fired, exposes a considerable quantity of the material. The nitrate is somewhat purified by crystallization before shipping. Iodine is a by-product in the purification process. The nitrate, when ready for shipment, contains about 96 per cent sodium nitrate, or about 16 per cent of nitrogen, 2 per cent of water, and small amounts of sodium chloride, sulphates, and insoluble matter.

The development of the nitrate industry may be appreciated from the fact that the product, which amounted in 1884 to 550,000 tons, increased to 1,000,000 tons in 1890, and to 1,660,000 tons in 1907. The output is exported almost entirely to Europe and the United States. It is held by persons who have examined these deposits that at the present rate of mining they will be exhausted by the year 1930, in which case a serious deficiency in fertilizer nitrogen will occur, unless a new supply shall meanwhile have been discovered.

Because of its easy availability, sodium nitrate acts quickly in inducing growth. For this reason it is used much by market gardeners, and for other purposes when a rapid growth is required. It is the most active form of nitrogen, with the possible exception of calcium nitrate. A light dressing on meadow land in early spring assists greatly in hastening growth by furnishing available nitrogen before the conditions are favorable for making available the more inert nitrogen of the soil. On small grain a similarly useful purpose is served where the soil is not rich.

Owing to the fact that nitrate is not absorbed by the soil in large quantities, it is easily lost in the drainage water; for this reason it should be applied only when crops are growing on the soil.

Ammonium Sulphate.— When coal is distilled a portion of the nitrogen is liberated as ammonia, and is found in the gas and in the ammoniacal liquor which condenses when the gas is cooled. Coal is distilled commercially in coal-gas plants and in by-product coke-oven works, the latter being the larger in tonnage. In either case the ammonia is recovered from the gas by washing it with water or with dilute sulphuric acid. Where water is used ammoniacal liquor is produced, this being a mixture of various ammonia compounds, among them the carbonate, sulphide, hydrosulphide, cyanide, sulphate, sulphite, thio-sulphate and chloride. The first four of them are classed as volatile because they give up their ammonia on boiling, whereas the remaining ones do not. The liquor is treated by steam distillation and the ammonia is driven off, the non-volatile portion being freed by adding lime. The ammonia gas then passes to a saturating box where it is bubbled through dilute sulphuric acid and sulphate of ammonia is formed. This is dipped from the box with long-handled copper ladles, drained and dried in a centrifugal, and is then ready to bag for shipment.

Where the washing of the gas is done with sulphuric acid, the sulphate is formed directly, and may be dried and bagged without further treatment. This process requires less apparatus and produces an equally high-grade of product.

Chemically pure sulphate of ammonia contains 21.2 per cent of nitrogen. The commercial product contains about 20 per cent of nitrogen. It is the most concentrated form in which nitrogen can be purchased for use as a fertilizer. Its effect on crops is not so rapid as that of sodium nitrate, but it is not so quickly carried from the soil by drainage water, as the ammonium salts are readily absorbed by the soil. A pound of nitrogen in the form of ammonium sulphate has about the same agricultural value as the same amount in the form of nitrate of soda if the soil on which it is used is abundantly supplied with lime; but on an acid soil ammonium sulphate has less value.

The long and extensive use of ammonium sulphate on a soil has a tendency to produce an acid condition, through the accumulation of sulphates which are not largely taken up by plants. Ammonium sulphate, like sodium nitrate, should not be applied in autumn, as the ammonia is converted into nitrates and leached from the soil.

Chemical Processes for the Fixation of Nitrogen.— There are now several chemical processes for the fixation of atmospheric nitrogen, two of which are well known and were in use on a commercial scale before the outbreak of the present war, the others are more recent, and exact knowledge regarding them is rather difficult to obtain.

Calcium Cyanamide.— The fertilizers produced by the older processes are calcium cyanamid and calcium nitrate. The former is sold in this country under the trade name «Cyanamid.» One process for its production consists in passing nitrogen into closed retorts containing powdered calcium carbide heated to a high temperature; the product being calcium cyanamide and free carbon:—

$$CaC_2+N_2=CaCN_2+C$$

In preparing the calcium carbide for this process it must be ground out of contact with air. The nitrogen required for the process is obtained either by passing air over heated copper, or by the fractional distillation of liquid air.

The fertilizer, as placed on the market, is a heavy black powder or granulated material with a somewhat disagreeable odor, the dark color being due to the carbon set free in the process and which remains distributed in the cyanamid.

Cyanamid as manufactured in this country has about the following composition:

		Per cent
Calcium cyanamide	$CaCN_2$	45.92
Calcium carbonate	$CaCO_3$	4.04
Calcium sulphide	CaS	1.73
Calcium phosphide	Ca_3P_2	0.04
Calcium hydroxide	$Ca\ (OH)_2$	26.60
Free carbon	C	13.14
Iron and aluminia	R_2O_3	1.98
Silica	SiO_2	1.62
Magnesia	MgO	0.15
Combined moisture		3.12
Free moisture	H_2O	0.35
Undetermined		1.31
		100.00

According to this composition the material would contain 16 per cent of nitrogen. Lime in the form of carbonate and hydroxide would add something to its value, and the residue of calcium cyanamide, which upon decomposition becomes calcium hydroxide, is likewise beneficial to the soil.

Calcium cyanamide must decompose in the soil before its nitrogen becomes available to plants. There are several steps in the decomposition process by which the nitrogen finally emerges in the form of ammonia. The intermediate products formed during decomposition will vary somewhat with the condition of the soil. When, for instance, a soil is saturated with water, or when it is acid some more or less injurious substances may be formed. For this reason "cyanamid" is not likely to be so satisfactory on soils of this nature as on better soils. To very sandy soils it is not well suited. Under good conditions its fertilizing value is not greatly below that of sodium nitrate and is about equal to that of ammonium sulphate when not used in heavy applications.

It should be incorporated with the soil at least a week before planting, as it may injure the young plants if decomposition has not proceeded far enough to remove its somewhat toxic properties. As it must undergo this decomposition before its nitrogen becomes available to young plants, there is an added reason for this precaution. It does not give its best results as a top-dressing because it requires incorporation with the soil for its proper decomposition.

Other Fixation Processes.— The first commercial process for the fixation of nitrogen was the arc process. Its use, however, is confined to Norway where 250,000 kilowatts of electricity are employed in its use. By this process nitrogen and oxygen are directly burned to nitric acid under the influence of the electric arc. The resulting product is nitric acid, which is neutralized with lime forming calcium nitrate, a fertilizer somewhat similar to nitrate of soda. Owing to the enormous electrical power required the operation is an expensive one unless the electricity can be cheaply developed, as when water power is abundantly available, which is the case in Norway. It does not seem likely that the process will be extensively adopted in this country.

There are several very promising processes that have been brought forward since the beginning of the present war, but which on account of the great demand for explosive combinations of nitrogen have not been applied to the production of fertilizers.

Organic Carriers of Nitrogen.— Organic nitrogenous fertilizers include cotton-seed meal (7 per cent nitrogen when free from hulls), linseed meal (5.5 per cent nitrogen), castor-pomace (6 per cent nitrogen), and a number of refuse products from packing houses, consisting of red-dried blood (13 per cent nitrogen), black-dried blood (6 to 12 per cent nitrogen), dried meal (13 per cent nitrogen), hoof-meal (12 per cent nitrogen), ground fish (8 per cent nitrogen), and tankage (concentrated 10 to 12 per cent, crushed, 4 to 9 per cent nitrogen); also leather-meal, and wool-and-hair waste, which last two on account of their physical condition are of little value.

The forms in which combined nitrogen is available to most agricultural plants are nitrates, ammonium salts and certain organic compounds. Of the latter the simpler compounds, like urea, appear to be most readily taken up by plants. Decomposition is therefore a necessary process for most of the organic fertilizers before their nitrogen becomes available, and their usefulness is, in general, proportional to the readiness with which aerobic decomposition proceeds, or to the proportion of available compounds which they contain in their original condition. Guano, for instance, apparently, contains much nitrogen that is available without further decomposition. Dried blood quickly decomposes and soon forms available substances. In fact, it produces results more quickly than any other form of organic nitrogen.

Dried meat contains a high percentage of nitrogen, but does not decompose so readily as dried blood, and is not so desirable a form of nitrogen. Hoof meal while high in nitrogen, decomposes slowly, being less active than dried blood. Ground fish is an excellent form of nitrogen, and is as readily available as blood but has a lower nitrogen content. Tankage is highly variable in composition, and the concentrated tankage being more finely ground, undergoes more readily the decomposition necessary for the utilization of the nitrogen. Crushed tankage contains from 3 to 12 per cent of phosphoric acid, in addition to its nitrogen. Leather meal and wool-and-hair waste when untreated are in such a tough and undecomposable condition that they may remain in the soil for years without losing their structure. They are therefore not to be recommended as fertilizers.

Phosphate Fertilizers.— By the term phosphate fertilizers is meant those substances that are used for manures chiefly because of the phosphorus they contain. The phosphorus is generally present in the form of a phosphate of lime, iron and alumina mixed with other substances. Some of these phosphates also contain organic matter, in which case they generally carry some nitrogen, which adds something to their value as fertilizers. Phosphates associated with organic matter decompose more quickly in the soil than purely mineral phosphates, and are therefore more readily available fertilizers.

Bone-Phosphate.— The bones of animals have been for a great many years an important form of phosphate manure. Formerly bones were used entirely in the raw condition, either ground or unground. In the ground condition they are a more quickly acting fertilizer. Raw bones contain about 22 per cent phosphoric acid and 4 per cent nitrogen. The phosphoric acid is in the form of tricalcium phosphate.

At the present time most of the bone used as manure is first boiled or steamed. This frees it from fat and nitrogenous matter both of which are used in other ways. Steamed bone is a more valuable fertilizer than raw bone, as the fat in the latter retards decomposition and also because the steamed bone is in a better mechanical condition. The form of the phosphoric acid is the same as in the raw bone and varies from 28 to 30 per cent, while the nitrogen is reduced to about 1½ per cent. Bone tankage, which has already been spoken of as a nitrogen fertilizer, contains from 7 per cent to 9 per cent phosphoric acid, largely in the form of tricalcium phosphate. All of these bone-phosphates are slow-acting fertilizers and should be used finely ground and for the permanent benefit of the soil rather than as direct plant-food material.

Mineral Phosphates.— There are many natural deposits of mineral phosphates scattered over the earth, some of the most important of which are in America. The phosphorus in all of these is in the form of tricalcium phosphate, but the materials associated with it vary greatly.

Coprolites are concretionary nodules found in the chalk or other deposits in the south of England and in France, the name having been given them on the assumption that they consisted of fossilized animal excrement. They contain 25 to 30 per cent of phosphoric acid, the other constituents being calcium carbonate and silica.

Apatite is found in large quantities in the provinces of Quebec and Ontario, Canada. It occurs chiefly in crystalline form. The calcium phosphate of which it is composed is in one form associated with calcium fluoride and in the other with calcium chloride. The Canadian apatite contains about 40 per cent phosphoric acid, being richer in this ingredient than that found elsewhere. Phosphorite is another name for apatite, but is chiefly applied to the impure amorphous form.

South Carolina phosphate occurs in the form of lumps from the size of a pebble to a mass weighing a ton. These are distributed through a deposit varying from 1 to 20 feet in thickness, which occurs both on the land and in the river beds. It contains from 26 to 28 per cent of phosphoric acid and but a very small amount of iron and aluminum. As these substances interfere with the manufacture of superphosphates from the rock, their presence is very undesirable, rock containing more than 3 to 6 per cent being unsuitable.

Florida phosphates are found in the forms of soft phosphate, a whitish product somewhat resembling clay and largely contaminated with it; pebble phosphate, consisting of hard pebbles; rock or boulder phosphate, consisting as the name implies of rocks or boulders. Soft phosphate contains from 18 to 30 per cent of phosphoric acid and on account of its being more easily ground than most of these rocks is applied to the land without being first converted into a superphosphate. Pebble rock constitutes the major portion of the Florida phosphate. It contains from 20 to 40 per cent of the phosphoric acid, being very variable in composition. Rock or boulder phosphate is much more uniform in composition than the other kinds, but there is less of it. It contains about 40 per cent of phosphoric acid.

Tennessee phosphate differs from the Carolina and Florida phosphate in that it does not exist as nodules, pebbles or boulders, but in veins and pockets and does not need to be washed previous to its treatment. It contains from 30 to 35 per cent of phosphoric acid.

Utah, Wyoming and Montana contain deposits of mineral phosphate interbedded among limestones and shales with amount estimated at nearly six billion tons. At present they are not producing much, the output in 1916 being only 1,700 tons. This is because of the small local demand for fertilizer and high cost of transportation to distant markets. In Idaho there is high grade phosphate on both sides of Blackfoot River, in Fort Hall Indian Reservation, near Montpelier and north of Bear Lake. In Utah the deposits are in the Wasatch, Oquirrh and Uinta ranges and east of Bear Lake. In western Wyoming the deposits are mostly in Wind River, Gros Ventre, Salt River and Owl Creek ranges, and in Montana the deposits are near Ellison, Garrison, Philipsburg and Melrose. The material is generally an even-bedded gray to brown or black oolitic rock, closely resembling limestone, and emitting a fetid odor when struck with a hammer. Weathered surfaces have a light-bluish or white coating commonly in reticulated pattern. Many of these deposits carry 65 to 81 per cent of tricalcium phosphate and are four to six feet thick. On places there are two or more beds and they extend for many miles. Most of the areas underlain by the thicker beds are government land, parts of which have been withdrawn from entry in order to preserve them for a reserve which can be developed for the use of the people.

Basic slag, or as it is also called, phosphate slag, or Thomas phosphate, is a by-product in the manufacture of steel from pig iron rich in phosphorus. The phosphoric acid present is in the form of tetracalcium phosphate $(CaO)_4P_2O_5$. It also contains calcium, magnesium, aluminum, iron manganese, silica and sulphur. On account of the presence of iron and aluminum and because its phosphoric acid is more readily soluble than the tricalcium phosphate, the ground slag is applied directly to the solid without treatment with acid. It is produced in large quantities in England, Germany and France.

Superphosphate Fertilizers.— In order to render more readily available to plants the phosphoric acid contained in bone and mineral phosphates, the raw material, purified by being washed and finely ground, is treated with sulphuric acid. This results in a replacement of phosphoric acid by sulphuric acid with the formation of monocalcium phosphate and calcium sulphate, with a smaller amount of dicalcium phosphate, according to the reactions: $Ca_2 (P O_4) + 2H_2 SO_4 = Ca H_4 (P O_4) 2 + 2CaSO_4$ and $Ca_3 (P O_4)_2 + H_2S O_4 = Ca_2 H_2 (P O_4)_2 + Ca S O_4$.

The tricalcium phosphate, being in excess of the sulphuric acid used, a part of it remains unchanged.

In the treatment of phosphate rock part of the sulphuric acid is consumed in acting upon the impurities present, which usually consist of calcium and magnesium carbonates, iron and aluminum phosphates and calcium chloride or fluoride, converting the bases into sulphates and freezing carbon dioxide. water, hydrochloric acid and hydrofluoric acid. The resulting superphosphate is therefore a mixture of monocalcium phosphate, dicalcium phosphate, tricalcium phosphate, calcium sulphate and iron and aluminum phosphates.

In the superphosphates made from bone the iron and aluminum sulphates do not exist in any considerable amounts. However, as long as the phosphoric acid remains in the form of monocalcium phosphate the value of a pound of available phosphoric acid in the two kinds of fertilizer is the same, but the remaining tricalcium phosphate in the bone superphosphates has a greater value as before explained.

The superphosphates made from animal bone contain about 12 per cent available phosphoric acid and 3 or 4 per cent of insoluble phosphoric acid. They also contain some nitrogen. Bone-ash and bone-black superphosphates contain practically all of their phosphoric acid in an available form, but they contain little or no nitrogen. South Carolina rock superphosphate contains from 12 to 14 per cent available phosphoric acid, including from 1 to 3 per cent reverted phosphoric acid. The best Florida superphosphates contain from 17 per cent downward of available phosphoric acid, part of which is reverted. The Tennessee superphosphates vary from 14 to 18 per cent available phosphoric acid.

Reverted Phosphoric Acid.— On standing, a change sometimes occurs in superphosphates by which a part of the phosphoric acid becomes less easily soluble and to that extent the value of the fertilizer is decreased. This change, known as «reversion,» is much more likely to occur in superphosphates made from rock than in those derived from bone. It also varies in different samples, a well-made article usually undergoing little change even after long standing. It is supposed to be caused by the presence of undecomposed tricalcium phosphate and of iron and aluminum sulphates.

The decrease in solubility of the superphosphate is due in part at least to the interaction of monocalcium phosphate and tricalcium phosphate leading to the formation of dicalcium phosphate and perhaps to the formation of ferric and aluminum phosphates by the action of monocalcium phosphate upon the iron and aluminum sulphates.

Double Superphosphates.—In making superphosphates, a material rich in phosphoric acid must be used, not less than 60 per cent tricalcium phosphate being necessary for their profitable production. The poorer materials are sometimes used in making what are known as double superphosphates. For this purpose they are treated with an excess of dilute sulphuric acid; the dissolved phosphoric acid and the excess of sulphuric acid are separated from the mass by filtering and are then used for treating phosphates, rich in calcium phosphate, forming superphosphates. The superphosphates so formed contain more than twice as much available phosphoric acid as those made in the ordinary way.

Relative Availability of Phosphate Fertilizers.— Superphosphates and double superphosphates contain their phosphoric acid in a form in which it can be taken up by the plant at once. They are therefore best applied at a time when the crop is planted or just before, or they may be applied when the crop is growing. Well-made superphosphates contain no free acids and therefore are not injurious to vegetation unless used in excess.

Reverted phosphoric acid, although not soluble in water, is readily soluble in dilute acids. Its value as a ready source of food for plants has been the subject of much discussion among agricultural chemists. It is now quite generally believed that it furnishes an available supply of phosphoric acid to the plant.

Crude phosphate rock is sometimes used as a fertilizer without being treated with acid. Owing to the slight solubility of this material it acts slowly and should be applied in very large quantities — enough to last several years. It should also be very finely ground. It appears to be used more profitably on the rich prairie soils of the Middle West than in the Eastern States. Experiments in Indiana, Ohio and several States further east have given results unfavorable to the use of ground phosphate rock, or «floats» as they are sometimes called.

Potash Fertilizers.— The production of potash fertilizers is largely confined to Germany, where are inexhaustible beds varying from 50 to 150 feet in thickness lying under a region of country extending from the Harz Mountains to the Elbe River and known as the Stassfurt deposits. These deposits of potash salts have been mined since 1862, during which time they have constituted the world's principal supply of potash. They are operated by a syndicate comprising all the large owners and maintaining a uniform price on the output. The principal salts placed on the market are sylvine (potassum chloride); sylvinite, a mixture of sylvine, rock-salt and kainite; carnallite (magnesium chloride and potassium chloride); schoenite (magnesium sulphate and potassium sulphate); kieserite (magnesium sulphate with carnallite); kainite (magnesium sulphate and potassium chloride, or magnesium and potassium sulphates and magnesium chloride); polyhalite (potassium, calcium and magnesium sulphates).

The potash fertilizers contain their potassium either as chloride or sulphate. The chloride has the advantage of being more diffusible in the soil but in most respects the sulphate is preferable. Potassium chloride has an injurious effect upon such crops as tobacco, sugar-beets and potatoes. In tobacco the potassium chloride in the ash prevents the proper burning of the tobacco. In the case of clover, corn and grass, however, potassium chloride appears to have no harmful effects.

Kainite.— The potash contained in kainite is in the form of sulphate, but because of the large quantities of other salts it contains, chiefly sodium and magnesium chloride, it has the same effect upon plants as has the chloride. It contains from 12 to 20 per cent of potash and 25 to 45 per cent of sodium chloride, with some chloride and sulphate of magnesium. Kainite should be applied to the soil a considerable time before the crop which it is intended to benefit is planted. It should not be drilled in with the seed. By this method of application the injurious properties of the chlorides will not affect the crop. Indirectly kainite serves to supply the plant with food other than potash. The salts associated with the potash, particularly the chlorides, aid plant-growth by making other substances in the soil, particularly phosphoric acid, more available to the plant, besides improving the physical condition of the soil.

Sylvinite.— This salt contains its potash both as chloride and as sulphate. It also contains sodium and magnesium chlorides. It contains about 16 per cent potash. Owing to the presence of chlorides it has the same effect as kainite.

Muriate (Chloride) of Potash.— This is a more concentrated form of potash than either of those just mentioned. It contains about 50 per cent of potash, making it 80 per cent potassium chloride. The impurities are largely sodium chloride and insoluble mineral matter. A purer form of muriate of potash may be obtained which contains 98 per cent pure potassium chloride.

Sulphate of Potash.— High-grade sulphate of potash contains from 49 to 51 per cent of potash. Its advantage over muriate is that it is not, like the latter, injurious to any crops; but it has the disadvantage of being more expensive.

Schoenite.— This is a double sulphate of potash and magnesium. It contains about 26 per cent of potash. The cost of the potash is greater than in the muriate. The sulphate of magnesium it contains is supposed to have a beneficial effect upon the soil.

Potash Production in the United States.— The potash resources of the United States are most inadequate to meet the present needs owing to the loss of the German supply from the autumn of 1914 to the present (1918). In 1911 this country imported, mainly from Germany, 672,639,518 pounds of potash salts valued at $11,826,106. There have recently been many efforts made to obtain potash in a form suitable for use as a fertilizer. Wood ashes constituted about the only domestic source of potash supply previous to 1914. At present the largest quantity comes from some of the alkali lakes of the arid or semi-arid regions, the waters of which carry enough potash in solution to make its recovery profitable at present prices.

Another source of potash is the kelp or giant sea weed that grows in the Pacific Ocean from Lower California to Alaska. The ash of the plants contain about 30 per cent of potash. Machinery has been built for harvesting the plants and the operation of recovering potash has been conducted on a small scale. It is not likely, however, that the quantity of potash secured in this way will ever constitute any large part of the total amount required by the fertilizer industry of this country.

Alunite, a hydrous sulphate of potash and alumina, is a possible source of potash and one that has been worked in a small way. Several processes for the extraction of potash from this mineral have been proposed and the recovery of potassium sulphate appears to be a rather simple matter.

Another enterprise that has been tried with some degree of success is the recovery of potash from the flue dust of Portland cement plants, some potash bearing rocks or minerals being added to the raw products used in the burning process.

The extraction of potash from silicate rocks has received a great deal of attention during the last few years. Among the materials used experimentally for this purpose are feldspar, of which there are small deposits scattered widely over the United States; leucite, occurring as one constituent of a rock of which immense quantities are found in Wyoming; sericite, in extensive beds in Georgia, and green sand, of which large deposits are found in New Jersey.

By application of heat and fluxes to lower the melting point of the slag, it has been found possible to convert almost all of the potash into a form soluble in 2 per cent citric acid or into a condition considered to be available to plants. One distinct disadvantage which these silicates possess is that their content of potash is low and much material must be handled in order to obtain the rather small percentage of potash.

By means of these various processes there were produced in the United States during 1916 a total quantity of 20,000,000 pounds of potash salts, valued at $3,500,000.

Other Fertilizing Materials.— There are a number of fertilizers not included in the classes already mentioned. Many of them are very valuable sources of fertility.

Wood Ashes.— For some time after the use of fertilizers became an important farm practice, wood ashes constituted a large portion of the supply of potash. They also contain a considerable quantity of lime and a small amount of phosphoric acid. The product known as unleached wood ashes contains 5 to 6 per cent of potash, 2 per cent of phosphoric acid and 30 per cent of lime. Leached wood ashes contain about 1 per cent of potash, 1.5 per cent of phosphoric acid and 28 to 29 per cent of lime. They contain the potash in a readily available form as potassium carbonate. The lime conduces to a good physical condition of the soil.

Guano.— This fertilizer has been formed from the excrement and carcasses of sea-fowl. The composition of guano depends upon the climate of the region in which it is found. Guano from an arid region contains nitrogen, phosphoric acid and sometimes potash, while that from a region where rains occur contains only phosphoric acid, the nitrogen and potash having been leached out. In a dry guano the nitrogen occurs as uric acid, urates and in small quantities ammonium salts. A damp guano contains more ammonia. The phosphoric acid is present as calcium phosphate, ammonium phosphate and as phosphates of other alkalies. A portion of the phosphate is readily soluble in water. All of the plant food is thus either directly available or becomes so soon after admixture with soil. The composition is extremely variable. Guano was formerly a very important fertilizing material but the supply has become so nearly exhausted that it is relatively unimportant at the present time. South America, South Africa, Australia and certain islands in the Pacific contribute to the supply. Other fertilizers of less value are powder-waste, agricultural salt, cotton-hull ashes, coal ashes, seaweed, king-crab, mussel and lobster shells, muck, peat, marl, tobacco stems and stalks, crude fish-scrap, wool and hair waste, sewage, street sweepings, etc.

Catalytic Fertilizers.— The term catalytic fertilizer has been used rather loosely to designate a class of substances that, when added to a soil, increase plant growth by apparently accelerating the processes that normally take place in soils. They do not really function as fertilizers because their value does not lie in the nutrients that they possess. The term catalysis is employed in a chemical sense to mean a change brought about in a compound by an agent that itself remains stable. When an attempt is made to study these phenomena in soils, it becomes difficult, owing to the multiplicity of factors and reactions, to determine whether the agent is acting in a purely catalytic manner.

A large number of substances have been found to act as catalytic fertilizers. Among these are various salts of manganese, iron, aluminum, zinc, lead, copper, nickel, cobalt, uranium, boron, cerium, lanthanum, and the like. These substances when used in small quantities stimulate plant growth, but are toxic in large amounts.

Of the various plant stimulants mentioned manganese is the only one that gives promise, at the present time, of usefulness on a commercial basis. The manganese salts that have been found to be effective as fertilizers are the sulphate, chloride, nitrate, carbonate and dioxide. Of these the first has been most often used, and in quantities up to 50 pounds an acre it has in most cases not been toxic. It is supposed to be most effective on poor soils that are not acid.

Lime.— This substance is not a fertilizer in the same sense as are the materials previously discussed. It is because of its effect on the soil rather than directly on the plant that lime is applied to soils. The forms in which it is used are (1) ground limestone, (2) marl, (3) air-slaked lime, (4) quick-lime, (5) water-slaked lime.

Lime is applied to soils to correct what is called acidity of the soil, which arises from a large removal of basic material by crops and drainage water and to other minor causes. This condition is widespread in soils and is increasing so that the agricultural lime industry is growing rapidly. The tendency in the business at the present time is to produce ground limestone rather than burnt lime. The ground limestone is somewhat more bulky to transport, but it is much easier for the farmer to handle and it may be kept without danger of heating. Owing to its bulk and the large quantities applied per acre lime is not usually transported long distances, and this is one reason why the grinding mills are scattered so widely over the regions in which limestone is found. Dolomitic limestone may be used on most soil with profit, but the trade usually prefers a lime with only a small percentage of magnesia.

Home Mixing of Fertilizers.— Fertilizers are ordinarily sold as (1) complete fertilizers containing nitrogen, phosphoric acid and potash, which in different mixtures are to be found in different relative amounts; and (2) incomplete fertilizers, or raw material containing only one of these ingredients. Authorities at a number of the experiment stations have urged that it is in many cases more profitable for the farmer to purchase the incomplete fertilizers and mix them himself. The arguments advanced in favor of this practice are that the materials can be purchased more cheaply in that form than when mixed by the manufacturer; that they can be used in the proportion desired, which may effect a saving in the amount of some ingredient, and that the form in which each ingredient is present is then known, which is not always the case when mixtures are purchased.

On the other hand, it is more difficult to obtain the raw materials from the small dealer, and when purchased they are not generally so finely ground as they are in the mixtures.

State Control of Fertilizer Sales.—In most States in which fertilizers are largely used laws are in effect compelling manufacturers or dealers in fertilizers to state the actual amounts of the fertilizing ingredients contained in the fertilizers offered for sale, and also to state in what form each of these ingredients exist. A chemical control is provided and a penalty imposed for any failure to comply with the law. The control authorities publish each year a statement of the commercial value per pound of nitrogen, phosphoric acid and potash in each of the various forms in which they occur in fertilizers. Fertilizer control is in most States attached to the State agricultural experiment stations, and information concerning the purchase and use of fertilizers may be obtained from these institutions

Statistical.— The quantity of fertilizers manufactured and consumed is increasing in all portions of the crop-producing world; and especially in the United States there has been a rapid increase from one decade to another. In 1859 the value of the entire output of the fertilizer factories was $891,344; in 1869, $5,815,118; in 1879, $23,650,795; in 1889, $39,180,844; in 1899, $44,657,385 and in 1909, $103,960,213. Not all of this is used on farms in this country, there being $8,700,640 worth exported in 1910. The imported fertilizer materials consisted largely of nitrate of soda and potash salts, while the exported fertilizers were animal refuse and phosphate fertilizers.

Although the commercial fertilizer industry is little more than half a century old, the sale of fertilizers in the United States in 1909 amounted to $114,883,000, an increase of 115 per cent as compared with the expenditure in 1899. This large quantity of fertilizer was largely used in a rather narrow strip of country lying along the Atlantic seaboard. The South Atlantic states show a higher rate of increase in expenditures for fertilizers between 1899 and 1909 than any other, such increase amounting to 162.3 per cent, but Ohio shows an increase of 155 per cent and Indiana of 141 per cent for the same period, which indicates a westward movement of the practice of using fertilizers.

As is naturally to be expected, the first settled and longest cultivated portion of the country is that using the greatest quantity of fertilizers. This region lies nearest to the large centres of population and hence of consumption; it produces crops of greatest acre value; and it is so situated that the distances which it is necessary to transport fertilizers are generally less than they would be for the non-fertilizer-using portion of the country. It is true in the United States, as it is in Europe, that a large consumption of fertilizers usually goes hand in hand with a highly developed and intensive system of agriculture.

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FESCENNINE VERSES, an early kind of Italian poetry, originally sung at harvest festivals, and finally spreading to the towns where they became common at private gatherings, especially weddings. Later they were restricted to weddings altogether. They were somewhat coarse and often degenerated into malicious raillery and licentiousness. Festus states that the verses were introduced from Fescennia, in Etruria, but such origin is problematical. (See LATIN LITERATURE). Consult Knapp (in *American Journal of Philology,* XXXIII, 146-148, 1912) and Schanz, 'Geschichte der römischen Litteratur' (3d ed., Munich 1907).

FESCH, fesh, **Joseph,** French ecclesiastic: b. Ajaccio, Corsica, 3 Jan. 1763; d. Rome, 3 May 1839. He was half brother to the mother of Napoleon. After Bonaparte in 1801 concluded the concordat with Pius VII, he became in 1802 archbishop of Lyons, and next year a cardinal. He was likewise appointed French ambassador at Rome, and made himself very acceptable to the Pope by his ultramontane tendencies. On the approach of the Austrians in 1814 he fled with his sister, Madame Bonaparte, to Rome, but Napoleon's return brought him back to France, and he acted as a peer during the Hundred Days. When called upon by the Bourbons to resign his episcopal rights he decidedly refused, but in 1825, after a papal brief interdicted him from exercising spiritual jurisdiction, he renounced the office, but retained the dignity.

FESCUE, the popular name of a genus of grasses (*Festuca*), numbering upward of 80 species. The genus is of wide geographical distribution, but particularly numerous in the temperate regions, where they are among the most important of the pasture and fodder grasses. About 25 species are found in North America, many of them naturalized from Europe. The red fescue (*Festuca rubra*) serves to bind loose soil, and is also a good hay grass. The tall meadow fescue (*F. elatior,* var. *partensis*) is a fibrous-rooted perennial, growing from two to three feet high in low meadows and pastures, where it forms fresh herbage among the earliest of the cultivated grasses. The sheep's fescue (*F. ovina*) is much smaller. Sheep's fescue exists in many varieties in the northwestern States, especially in the Rocky Mountain region. Some of the varieties attain the height of two or three feet, but for the most part they are rarely more than a foot high, producing a large amount of fine herbage, which is valuable for grazing, especially for sheep. Some of the native varieties are well worthy the attention of the agriculturist. All the forms of *F. ovina* are "bunch-grasses," and are devoid of the creeping roots, the presence of which distinguishes the red fescue (*F. rubra*) from this species. Sheep's fescue is well adapted for cultivation on light, dry soils, especially those which are shallow and silicious. A tall species is the giant fescue (*F. gigantea*), which occurs in shady woods and similar situations, from Maine to New York, adventive from Europe.

FESSENDEN, Reginald Aubrey, American electrician: b. Milton, Quebec, Canada, 6 Oct. 1866. He was chemist-in-chief in Thomas Edison's laboratory from 1887 to 1890 and the two following years an electrician with the Westinghouse Company of Newark, N. J. He was elected professor of electrical engineering in the Western University of Pennsylvania in 1893. He is the author of many inventions in electrical and chemical engineering and has written numerous scientific papers. From 1900 to 31 Aug. 1902, he was a special agent of the United States Weather Bureau, in charge of investigations in wireless telegraphy as an aid to the collection of daily weather reports.

FESSENDEN, Thomas Green, American author: b. Walpole, N. H., 22 April 1771; d. Boston, 11 Nov. 1837. He was graduated from Dartmouth College in 1796. He went to London in 1801, and while there published anonymously a satirical poem, 'Terrible Tractoration' (1803). He returned to the United States; did literary work in New York; went to Boston and founded the 'New England Farmer' (1822). Some of his publications were 'The American Clerk's Companion' (1815); 'The Ladies' Monitor' (1818); and 'Laws of Patents for New Inventions' (1822).

FESSENDEN, William Pitt, American statesman: b. Boscawen, N. H., 16 Oct. 1806; d. Portland, Me., 8 Sept. 1869. He was graduated at Bowdoin College in 1823 and admitted to the bar in 1827. He entered politics and soon acquired a national reputation as a lawyer and a Whig. He was elected to the United States Senate in 1854, and a week after he took his seat made a speech against the Kansas-Nebraska Bill which placed him in the front rank of senatorial orators. During the Civil War he was conspicuous for his efforts to sustain the national credit. He was made Secretary of the Treasury in 1864, and having placed it on a firm basis, resigned in 1865 to return to his seat in the Senate.

FESSLER, fĕs'lĕr, **Ignaz Aurelius,** Hungarian historian: b. Czurendorf, 18 May 1756; d. 15 Dec. 1839. He joined the Capuchin order in 1773 and six years later was ordained to the priesthood. In 1784 he sent a letter to Joseph II in which he suggested methods for bettering the education of the clergy and calling attention to irregularities in the monasteries. An investigation followed and Fessler found he had made many enemies. In that year he became professor of Oriental languages and hermeneutics in Lemberg. His tragedy 'Sidney,' published in 1788, raised another storm and Fessler fled to Silesia. He was converted to Lutheranism in 1791 and five years later removed to Berlin where he joined the Masonic order and founded a humanitarian society. He held a government post for a time but lost it in 1806 and spent three lean years until summoned to Saint Petersburg in 1809 by Alexander I, who made him court councillor and professor of Oriental languages at the Alexander-Nevski Academy. After many other changes he finally became chief superintendent of the Lutheran communities of Saint Petersburg. He was the author of many works of which his 'History of Hungary’ is still of value. Consult his ‘Rückblick auf meine Liebzigjährige Pilgerschaft’ (2d ed., Leipzig 1851).

FESTA, Costanzo, cōs-tăn'zō fes'tä, Italian composer: b. Rome about 1496; d. there, 10 April 1545. He became a member of the pontifical choir 1517, and composed much church music, many madrigals for three voices, motets and litanies, many of his manuscript scores being still preserved in the archives of the pontifical chapel and the Vatican. His ‘Te Deum’ is sung at the election of new popes, the appointment of new cardinals and at the Festival of the Holy Sacrament. It was published in Rome in 1596.

FESTIN DE PIERRE. See DON JUAN.

FESTINIOG, Wales, town of Merionethshire in the northern division, at the head of a valley of the same name, 30 miles from Conway. There are large slate quarries nearby, in which many thousands are employed. The town is reached by the London and Northwestern, the Great Western and Festiniog railways. Pop. 11,435.

FESTIVAL. This word for celebration or merrymaking comes to us from the Latin (*festum*, feast) through the Old French tongue. The festival is an occasion of public rejoicing, of a religious, seasonal, national, local or complimentary character; in olden times always connected with the ecclesiastical ceremonies. In point of fact there can be no feasts in the sense covered by this article unless there be some form of organized religion; and the development of these two,— festivals and religion, —run parallel throughout all ages. The earliest of all festivals in the space of recorded time were connected with the cult of the dead, or ancestor worship. At such ancient banquets — feasting in common being a great civilizer — there was community with departed spirits and offerings and sacrifices. For a profound study of antique customs and survivals, and much other data on the whole subject, consult the monumental work on the ‘Principles of Sociology’ by Herbert Spencer (New York 1877–97). In the next and higher phase the wandering tribes, depending so much on the great luminaries, and particularly on the moon, are constrained to celebrate the monthly changes: these general notes holding good for all the great branches of the human family. Settling down to the pastoral and agricultural condition, calling forth a sensitiveness to the procession of the seasons and the aspects of the weather, the great solar festivals of the solstices and equinoxes were initiated and developed. Then society becoming still more complex with the rise of great empires, the gregarious and self-preserving instincts would prompt the setting apart of certain days for feasts of gratitude for deliverance, celebrations to mark great victories and in veneration of distinguished military and religious leaders.

Festivals of the American Indians.— The Indians of the great middle belt of North America, living mainly by hunting and agriculture, show these same characteristics in their festivities. Some tribal calendars are rich in a variety of festivals, all tending more or less toward the agricultural character. This is also seen in the basic simplicity with which the celebrations are conducted. On the other hand, there are tribes quite indifferent to time and season; and in such cases, it is essential to note, there are no festal ceremonies. Lunation is beyond all question the most important time division of the North American Indians. There are tribes that divide the year into 12 moons, and those that divide it by 13. Some of the feasts are very highly elaborated, occupying many days in the observances. It is customary for them to consist of a preliminary fast followed by symbolic dances or magic incantations terminating with a gluttonous orgy. Speaking broadly, there is a wide similarity in the festival customs of the various tribes; obvious differences being accounted for by questions of climate and environment. Fasting is generally practised among the tribes of North America; and, though often observed in connection with public ceremonials, is perhaps more often carried out in private. The first fast is usually the puberty fast. A militant expedition, a great hunt, or initiation into secret or religious societies, are invariably preceded by abstinence, more or less vigorous.

The Algonquin Indians of Virginia apportioned the year into the Budding or Blossoming seasons (Spring), Highest-Sun-season (Summer), Corn-or-Gathering season (Autumn) and Cohonk (Winter), a name taken from the cry of the wild geese during that quarter. The months were designated as the Moon-of-Stags, Corn-Moon, etc. They held regularly recurring festivals to celebrate ripening of fruits and grain, and more irregular feasts to mark return of wildfowl and hunting in a general way. The most important of all their celebrations was the harvest festivals, which lasted for several days. The dances were serious affairs and the recital of heroic songs goaded the young and thrilled the whole community. In a word, they would seem to be practically identical with present day observances.

The modern Creek Indians commence the New Year immediately after the celebration of the Busk, or ripening of the new corn, in August. They divide the year into summer and winter, and subdivide 12 successive moons: Heyóthluccour (Big-ripening Moon) August; Atauwoóskóchee (Little Chestnut Moon) September; Otauwoóskólúcco (Big Chestnut Moon), October, etc. The Cherokees, at the end of their year, burnt all rubbish, cleansed houses, fasted three days and took purgatives. All crimes but murder were pardoned that they might commence the year free of sin. Feasting and dancing announced the new year. These festivities also celebrated the four winds (the rain-bringers), the four mystic ancestors of the human race.

The Mandan (Dakotas) held a most elaborate pageant festival, the «Buffalo Dance,» to mark the beginning of the annual hunting season.

The festivals of the Thompson River Indians have been fully investigated and described by Teit. They appear to be almost wholly social in character and to possess little true seasonal significance.

The Hopi, or Moki, of Arizona, present us with one of the most perfectly developed and elaborate festival systems of the American Indian, exhaustively studied by several prominent anthropologists. Two factions, representing the old school and the new, are said never to take part in the same festival.

The harvest festivals of the Pima tribe of the southern branch of the Athapascan family are wild occasions of animal pleasure and could not strictly be called ceremonies.

The Apache Indians commonly celebrate «Illness Feasts» for the purpose of banishing sickness. Their principal celebration is the «Scalp Dance,» held after successful combats. They have few religious festivals.

The Iroquois have a «Feast of the Dead,» which occurs once in 12 years. The tribe proceeds to the burying place and after reviving the names of those who have been dead for 12 years, exhume their bodies and cast them into a pit along with clothing and provender.

The festivals of the tribes of California have been fully described and analyzed by Stephen Powers in 'Tribes of California' (1877). A curious festival of the Pomu race, called the «Grand Devil Dance,» is held once in seven years under the auspices of the fraternity of «Woman-Tamers» and is said to be abhorred by the women of the tribe. There is a show of the devil (Yu-ku-ku-la) visiting the tribe in the shape of some of its members. Against these demoniacal representatives, the men of the Pomu defend their women in mock gladiatorial display. This custom is said to have arisen out of the intractable nature of the women on the one side, and the sense of humor of the men on the other.

The ancient Toltecs and Aztecs of Mexico and the Incas of Peru had a richly developed calendar of festivals connected for the most part with the new moons and the summer and winter solstices and equinoxes. Another relic of ancestor worship is seen in the Peruvian custom of periodically assembling embalmed bodies of dead emperors in the great square of the capital to be feasted in company with the people.

Greek Festivals.— For the festive customs of primitive Greece the older Homeric poems are our main authority; these customs being simple in comparison with the highly developed system of festivals with which we become acquainted in the post-Homeric literature. Each of the peoples of ancient Greece had their own festivals, more or less similar at the root, but often quite distinctive in all other respects. In such a climate, with so hearty a people, we may well take Strabo seriously when he tells us that the Tarentines came to have more holidays than working days. The Athenian calendar contained about 60 festival days during which the administration of public affairs, and all regular business, was suspended. These included, in Gamelion (January), the *Lenæa* or wine feast in celebration of Dionysus (or Bacchus); in Anthesterion (February), the *Anthesteria* of Dionysus, the *Diasia* of Zeus, and the lesser Eleusinia; in Elaphebolion (March), the *Elaphebolia* of Artemis, the *Pandia* of Zeus, and the greater *Dionysia;* in Munychion (April), the *Munychia* of Artemis and the *Delphinia* of Apollo; in Thargelion (May), the *Thargelia* of Apollo and the *Plynteria* and *Callynteria* of Athena; in Scirophorion (June), the *Düpolia* of Zeus and the *Scirophoria* of Athena; in Hekatombaion (July), hecatombs were offered to Apollo, the summer-god; and in this month also were held the *Cronia* of Cronus and the *Panathenæa* of Athena (the most famous of all the festivals of Attica); in Metageitnion (August), the *Metageitnia* of Apollo; in Boëdromion (September), the *Boëdromia* of Apollo, the *Nemescia,* the anniversaries of the battle of Marathon, and the downfall of the 30 tyrants, and the celebration of the greater *Eleusinia;* in Pyanepsion (October), the *Pyanepsia* of Apollo, the *Oschophoria* of Dionysus, the *Chalkeia* or *Athenæa* of Athena, the *Thesmophoria* of Demeter and the *Apaturia;* in Maimacterion (November), the *Maimacteria* of Zeus; and in Poseideon (December), the lesser *Dionysia.*

Nearly all these events were nature-festivals, mainly associated with the procession of the seasons. Some commemorated mighty historical events; and the *Nemeseia,* or festival of the dead, was probably a survival of the old ancestor-worship of the East. The national feasts at which the games and the mighty dramas were played took a leading place in the life of Athens. For the games, see ISTHMIAN, NEMEAN, OLYMPIC, PYTHIAN.

Roman Festivals.— The chief of the very numerous festivals of the Roman calendar during the Augustan Age were as follows: In January, New Year's day, the *Agonalia,* and the *Carmentalia;* in February, the *Faunali,* the *Lupercalia,* the *Quirinalia,* the *Feralia,* the *Terminalia* (in earlier times the last day of the Roman year), the *Regifugium* or *Fugalia,* and the *Equiria;* in March, the *Matronalia* (a repetition of the *Equiria*), the festival of Anna Perenna, the *Liberalia* or *Agonalia,* and the *Quinquatria;* in April, the *Megalesia,* the *Ceralia,* the *Palilia,* the *Vinalia,* the *Robigalia* and the *Floralia;* in May, the festival of the *Lares Præstites,* the *Lemuria,* the *Ludi Martiales,* and the festival of Mercury; in June, the feast of *Semo Sancus,* the *Vestalia,* the *Matralia* and the *Quinquatrus Minusculæ;* in July, the *Ludi Apollinares,* and the *Neptunalia;* in August, the *Nemoralia* (Diana's Day), the *Consulia,* the *Vinalia Rustica,* and the *Vulcanalia;* in September, the *Ludi Magni* to celebrate Jupiter, Juno and Minerva; in October, the *Meditrinalia* (new wine festival), the *Faunalia,* and the *Equiria;* in November, the *Epulum Jovis;* in December, *Faunalia, Opalia, Saturnalia, Larentalia.* Of all these new and old festivals of the Augustan Age the most recent were the *Megalesia,* the *Ludi Apollinares,* the *Floralia* and the *Cerealia,* added to the calendar about the close of the 3d century B.C. mainly by foreign influence. Among the most ancient were the *Lupercalia* to celebrate Lupercus (fertility); the *Equiria* (Martial); the *Palilia* (a spring festival for the purification of the flocks and herds); the *Ludi Magni,* and the great winter solstice festival, the *Saturnalia,* the Roman equivalent of our Yuletide. In earlier times in Italy the festivals were comparatively few in number; some, like the Lemuralia and the Feralia, being expressions of animism. Later, Imperial Rome followed her usual receptive plans in dealing with conquered states and gave a warm welcome to many of the festival customs of her colonies. To such an extent were these importations carried that at one time there were more feast-days than work-days. The mimic battles on sea and land, the wild beast fights and gladiatorial combats, were often attended by great loss of life in the face of multitudes of admiring spectators. These contests, in which as many as 10,000 men would oppose each other, were suppressed at the beginning of the 5th century of the Christian era.

Miscellaneous.— The festivals of the ancient Zoroastrians (or Mazdasnans) of Persia were chiefly solar, and held at the equinoxes and solstices. The New Year's feast (the Fravardigan) was associated with relics of earlier barbaric rites and ceremonies; though the Zoroastrians, being a forward people, were singularly free from superstition. The great feast of the winter solstice, a prominent feature of the Mithra cult of Persia, influenced other popular religious forms of the Orient and is reputed to have originated Christmas for the Occident. Buddhism, another religion which reacted against much outward display, has gradually adopted some festive customs. In India the most important of these are Holi, held in March or April, and continuing for five days and the Dasahara which is observed in October. In Siam, the 8th day of the month, as well as the 15th, are analogous to our Sunday. In China, sects holds sacred the traditional anniversaries of the three respective days on which Buddha returned to earth to take up the burden of the world, on which he departed from the home of his parents and on which he fulfilled his destiny and entered into Nirvana. For all details of the intricate festival system of the Chinese, consult Doolittle's 'Social Life of the Chinese.' The most important of all these annual occasions in China is in honor of the dead at the winter solstice.

The Phrygian festivals were developed under the belief that the All-powerful fell asleep during the winter; therefore, at the autumnal equinox the Phrygians solemnized the eve of his retirement; and, at the spring equinox, they roused him from his bed with music and dancing and all manner of mirth, that as they thought he might be fully awake during the summer season.

It is customary among Mohammedans to observe the 10th day of each month, and also every Friday (called El-Gumah, the assembly). Though the latter is frequently described as the Mohammedan Sunday the administration of affairs goes on as usual, except during the time given to public devotions. Of the annual festivals the two most important are, first, the Eed es-Sagheer (or minor festival), ending the rigorous fast of Ramadan ("burning hot") which occasions an outburst of general rejoicing among Moslems the world over, continuing for three days (see RAMADAN); and, second, Eed el-Kebeer (or great festival) beginning on the 10th day of the last month of the Mohammedan calendar. It is a rather less hearty celebration than the one called the minor, though it also continues for three or even four days. The first 10 days of the first month of the year, Muharram, beginning at the autumnal equinox are kept in pious form, all ceremonies culminating on the 10th day, Yom Ashoora. Besides these, there are the birthday of Mohammed in the third month, the birthday of El-Hoseyn in the fourth month, the anniversary of Mohammed's mystic flight to Paradise on the 27th day of the seventh month, and several other anniversaries of a like kind.

In ancient Egypt the feasts were as various as the divinities. Lunar feasts in honor of the dead were general observances. But the celebrations which typically expressed the orthodox Egyptian mind supported a fanciful interpretation of the solar system: Osiris, the Sun-god, departed after the autumnal equinox, was found again about the winter solstice, and entered into the moon at the beginning of spring; all these occasions giving rise to special feasts and services, and the life-producing attributes of the sun were celebrated in orgies of sex. In later days, however, the festivals of Isis, under the dominance of Pantheism, were of a mystical rather than of a physical character. The annual rising of the worshipful Nile was also a festive occasion.

Jewish Festivals.— Not the least important events of the Jewish calendar are those connected with the institution of the Sabbath (meaning "secession from labor") closely associated from time immemorial with the feasts celebrating the new moon and the four phases of the moon. Seven was an occult number among both the Assyrians and Hebrews. On the appearance of the new moon on the sacred seventh month *Tisri*, the *Feast of Trumpets* was held, with additional burnt offerings and sacrifices. The *Sabbatical Year,* during which the land lay fallow and only what the earth of herself offered was taken, recurred every seventh year. The harvest was given to the poor and a cancellation of all debts prescribed. The law in its completeness was read to the people at the *Feast of Tabernacles* which opened the Sabbatical year. This Feast of Tabernacles, with the *Passover* and *Pentecost,* were annual solar festivals. The Passover (or "leap" feast) was held at the vernal equinox: the word having reference to the gamboling of lambs; the firstlings of the flocks, by antique custom, being sacrificed. This festival was held in conjunction with the *Feast of Unleavened Bread,* which was a celebration of a people who had developed from the pastoral into the agricultural state, and quite dissimilar in character. The Mazzoth cakes, which alone were eaten at this feast, simply originated among harvesters too busy at this time to superintend the slow operation of preparing yeast bread. The whole seven weeks, or 50 days, between this barley harvest and the gathering in of the wheat crop (the *Feast of Weeks* or *Pentecost*) was a season of merrymaking. The *Feast of Tabernacles* was observed from the 15th to the 22d of Tisri, and followed five days after the only fast day prescribed by the law, the *Day of Atonement.* The feast marked the completion of the harvest of fruit, olives and oil and wine, and closed the tribal year. The sacrifices were far more numerous than at any other feast. Historically it commemorated the wanderings in the wilderness.

Of the minor festivals the most important were the *Feast of Purim* held on the 14th and 15th of the month of Adar, the 12th month (said to have been instituted by Mordecai to commemorate the overthrow of Haman and the failure of the plots against the Jews, as detailed in the Book of Esther), the *Feast of the Dedication of the Temple* (which commenced on the 25th of Chislev, the ninth month, and lasted for eight days, instituted by Judas Maccabæus in B.C. 164; when the temple, which had been desecrated by Antiochus Epiphanes, was once more purified and rededicated), and the *Feast of Wood Offering* on the 15th of Abib: being the last of the nine occasions on which offerings of wood were brought for the use of the temple.

Christian Festivals.— The early Christian festivals were observed with a view to commemorating Christ and the canonized personages of the Church. We have good authority for the statement that very early in the history of the Church the weekly day of rest was transferred from Saturday to Sunday and called the Day of Joy or Resurrection. Gradually, in the course of the 2d century, two separate celebrations were held in the place of the Jewish Passover: the *Pascha Staurosimon* was the festival of the Death, the *Pascha Anastasimon*, of the Resurrection of Christ. The festival of Pentecost became the festival of the outpouring of the Holy Ghost and of the inauguration of the New Covenant.

Two new festivals were introduced in the course of the 4th century: *Epiphany* (q.v.), which had its origin in the East, and *Christmas* (q.v.). Of still later date are the festivals of the *Cross*, of the *Transfiguration*, of the *Trinity*, *Circumcision*, *Corpus Christi* and many others; and attendance at church was obligatory on all important occasions from about the beginning of the 6th century. Also, about this time, the calendar was divided into the three cycles of Advent, Easter and Pentecost. The adoration of Mary, the Mother of Jesus, found inevitable expression in the consecration of special days to her service. Of these (in addition to the month of May and each Saturday of each week, which in some parts of Christendom were entirely given up to her worship), the most widely known were the *Presentation*, *Annunciation* (Lady Day), *Assumption*, *Visitation* and the *Immaculate Conception*. Then gradually there came into the calendar the festivals of Angels, of Apostles, Saints, Martyrs, Souls, Ordinations, etc. So greatly did they increase, indeed, and so far did they depart from the ancient simplicity of their pious founders, that many ordinances were issued from time to time in an attempt to curb extravagance and unseemly practices. But it was only after generations of vigorous propaganda that Pope Urban VIII was at last persuaded in 1642 to reduce the number. Other pontiffs followed in his steps; notably, Benedict XIV in 1742, and Clement XIV in 1773. The festivals of the Christian churches have been divided into *feriæ statutæ* (being those that return annually without variation) *indictæ* (being proclamations extraordinary), *duplicia* (to be «doubly remembered»), *semiduplicia* (half double), etc. It follows that on occasions of more than ordinary importance a double office had to be recited. Of these, one is the customary feria and the other that of the feast. Semi-doubles are those in which the two offices are incorporated. Certain festivals of the first class are celebrated till the *octave* or 8th day following. There is also a division into weekly and yearly feasts; the yearly being divided into greater and minor, or into movable or immovable. Distinction is also drawn between *integri* (whole days), *intercisi* (half days), etc. For the Roman Catholic Church these differentiations are given with all detail in the general rubrics of the breviary. The Greek Church has an even more highly complex calendar than that of the Latin. The Church of England (Episcopalian), in the spirit of most of the Protestant churches of the Reformation, made various changes in the festal calendar. The following is the annual order of the Saints' days and Festivals, compiled from the English calendar, with some few exceptions.*

JANUARY	1 —	New Year's Day (Feast of the Circumcision).
	6 —	Twelfth Day (Old Christmas Day). Epiphany.
	12 —	Saint Agnes.
	25 —	Conversion of Saint Paul.
FEBRUARY	1 —	Saint Bridget.
	2 —	Candlemas (Feast of the Purification).
	3 —	Saint Blaise.
	5 —	Saint Agatha.
	14 —	Saint Valentine.
MARCH	1 —	Saint David (Welsh National Day).
	17 —	Saint Patrick (Irish National Day).
		Shrove Tuesday (Movable Feast: the *Mardi Gras* of the French and the *Pancake Tuesday* of the English).
		Mothering Sunday (Movable).
		Carling Sunday (Movable).
	25 —	Lady Day (Feast of the Annunciation).
		Palm Sunday (Movable).
		Good Friday (Movable).
		Easter Day (Movable).
APRIL	23 —	Saint George's Day (English National Day).
	25 —	Saint Mark, Rogation Sunday (Movable).
MAY	1 —	Feast of SS. Philip and James.
	3 —	Invention of Cross, Ascension Day.
		Whitsuntide (Movable).
JUNE		Trinity Sunday (Movable).
		Corpus Christi (Movable).
	24 —	Nativity of Saint John the Baptist (Midsummer Day).
JULY	15 —	Saint Swithin.
	25 —	Saint James, Saint Christopher.
	26 —	Saint Anne.
AUGUST	1 —	Lammas Day.
	15 —	Assumption of Blessed Virgin Mary.
	24 —	Saint Bartholomew.
SEPTEMBER	14 —	Holy Cross Day.
	29 —	Michaelmas Day (Saint Michael and All Angels).
OCTOBER	18 —	Saint Luke.
	25 —	Saint Crispin.
NOVEMBER	1 —	All Saints.
	2 —	All Souls.
	11 —	Saint Martin (Martinmas).
	23 —	Saint Clement.
	25 —	Saint Catherine.
	30 —	Saint Andrew (Scottish National Day).
DECEMBER	6 —	Saint Nicholas.
	21 —	Saint Thomas.
	24 —	Christmas Eve.
	25 —	Christmas Day (Yuletide).
	26 —	Saint Stephen.
	28 —	Childermas Day (Holy Innocents).
	31 —	Last Night of the Old Year.

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* Where no special observances are connected with particular Saints' Days these have been omitted from the lists.

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FESTOON, a string or chain of any material suspended between two points, usually consisting, however, of flowers, foliage, drapery, so suspended as to form one or more depending curves. In architecture, the term designates a sculptured ornament in imitation of a garland of flowers. It occurs frequently in Roman and Renaissance buildings.

FESTUS, Porcius, Roman procurator in Palestine about 60–62 A.D. It was he before whom Saint Paul was accused by the Jews; but the apostle appealing to the emperor, Festus sent him to Rome

FESTUS, Sextus Pompeius, Roman grammarian of the 3d or 4th century of our era, author of an abridgment of a work by Verrius Flaccus, called 'De Verborum Significatione,' a kind of dictionary, very valuable for the information it contains about the Latin language. The original work of Festus has been preserved only in imperfect MS., now at Naples, but it is more fully preserved in the abridgment made by Paul Diaconus.

FESTUS, Mo., city in Jefferson County, 30 miles southwest of Saint Louis, on the Frisco Lines, and the Mississippi and Bonne Terre Railroad, and on the Mississippi River. In the neighborhood are large deposits of silica sand, which is of great commercial importance to the city's manufactories of glass bottles and plate glass. The city owns the electric-lighting plant. Pop. 2,556.

FET (Shenshin), Afanasy Afanasevich, Russian poet: b. Orel 1820; d. 1892. He was educated in law and philology at the University of Moscow, where he was graduated in 1844. He entered the army in 1845 and saw active service in the war with Turkey in 1853–56. He assumed his mother's name, Fet, and was so known until permitted in 1874 to take his real name Shenshin. 'The Lyric Pantheon' appeared in 1840 and was well received. In 1850 another volume of his verse was published which had a large measure of success. He settled in the country in 1860 and in the next 17 years wrote occasional articles on agriculture. He removed to Kursk in 1877 and there issued scholarly translations of Goethe's 'Faust'; Schopenhauer's 'The World as Will and Idea', also of Horace, Virgil, Ovid, Juvenal, Propertius, Catullus and Tibullus. A third volume of poems, 'Fires of the Night,' appeared in 1883. Consult his 'My Reminiscences' (2 vols., 1890) and 'The Early Years of My Life' (1893).

FÊTE NATIONALE, fāte' nạ-sēō' nạl', the national holiday of the French Republic. In 1880, the 14 July, the anniversary of the fall of the Bastille, was made a national holiday, on which date were to be held military parades, also banquets and receptions, while the citizens throughout the land displayed the tricolor. The 22 September, the day on which the Republic was found, was made a national holiday in 1892.

FETERITA, fĕt-ėr-ē'tẹ, a sorghum of the durra group and native to the Sudan. It was introduced into the United States in 1906. It grows to a height of from 4½ to 7 feet and produces branches which mature after the main stems. It is planted, cultivated and harvested like corn. It is used for forage. About 50 bushels to the acre is an average production.

FETI, fā'tē, **Domenico** («Il Mantuano»), Italian painter: b. Rome 1589; d. 1624. He studied under Lorenzo Cardi and was made court painter to the Duke of Mantua. His works include frescoes in the cathedral of Mantua, 'David and Goliath,' now in the Dresden Gallery, 'The Flight into Egypt,' now in Vienna and 'Melancholy,' now in the Louvre. His works are numerous and examples are found in all important galleries of Europe.

FETIAL, or **FECIAL,** fē'shial, one of a college of priests in ancient Rome, said to have been instituted by Numa, consisting of 20 members, who presided over all the ceremonies connected with the ratification of peace or the formal declaration of war, including the preliminary demand for satisfaction, as well as the actual denunciation of hostilities. Their chief was termed Pater Patratus. When sent to a distance to conclude a treaty, they carried with them certain sacred herbs called verbenæ, or sagmina, which were gathered on the Capitoline Hill, and which were considered indispensable in their rites.

FÉTIS, fā-tēs, **François Joseph**, Belgian musical author and composer: b. Mons, Belgium, 25 March 1784; d. Brussels, 26 March 1871. He studied at the Paris Conservatoire under Boieldieu and Pradher. In 1821 he was made professor of counterpoint and fugue at this institution and in 1827 became its librarian. In 1833 he received and accepted a call to become director of the Brussels Conservatoire and maître de chapelle to the king of Belgium in which position he continued until his death. He was a prolific writer of church, piano and chamber music and also composed a number of overtures, symphonies and four operas. Of the last the most popular was 'La Vielle' (1826). His chief fame, however, rests on his writings on the theory, history and literature of music. He may also be considered the father of French musical journalism, having founded the first important French musical paper, *La Revue Musicale*, which he edited from 1827–33. His writings include 'Manuel des Compositeurs, ou Traité Méthodique de l'Harmonie' Paris n. d.); 'La Musique Mise à la Portée de Tout le Mond' (Liège 1830); translated into English as 'The History of Music, or How to Understand and Enjoy its Performance' (London 1846), and as 'Music Explained to the World, etc.' (Boston 1842); and into German as 'Die Musik, etc.' (Berlin 1830); 'Curiosités Historiques de la Musique, etc.' (Paris 1830); 'Biographie Universelle des Musiciens, etc.' (Brussels 1835–44); 'Histoire Générale de la Musique, etc.' (5 vols., Paris 1869–73; translated into German as 'Geschichte der Musik aller Nationen'). Of his smaller works may be mentioned 'Notice Biographique sur Nicolo Paganini, etc.' (Paris 1851, translated into English by W. Guernsey as 'Biographical Notice of Nicolo Paganini,' London n.d.); 'Antoine Stradivari, etc.' (Paris 1856, translated into English by J. Bishop as 'Notice of Stradivari, etc.,' London 1864). The following musical textbooks have had a wide circulation: 'Traité du Contre-point et de la Fugue, etc.' (2 vols., Paris 1824); 'Traité du Chant en Chœur, etc.' (Paris 1837, translated by T. Helmore as 'A Treatise on Choir and Chorus Singing,' London and New York 1854); 'Traité Complet de la Théorie et de la Pratique de l'Harmonie, etc.' (Paris 1849); 'Traité élémentaire de la Musique' (Bruselles n.d.).

FETISHISM, or FETICHISM, fē'tish-izm, the worship of material things (fetishes) as the abodes of spirits, or more strictly the belief that the possession of a thing can procure the services of a spirit lodged within it. It closely grades into idolatry, but differs in that the power is supposed to reside in the spirit, not the thing or image. It is the lowest of the unsystematic forms of worship found among uncivilized tribes, and exists especially among the negroes in Africa, but also among the natives of both Americas, the Polynesians, Australians and Siberians. The word itself is ultimately due to the Portuguese, the first Europeans to trade on the west coast of Africa, and is the Portuguese word *feitiço*, "artifast." Comte used it as a term to describe what he believed to be a necessary stage in the development of all religions in which all external bodies, natural or artificial, are supposed to be animated by souls essentially analogous to our own. Any object may become a fetish, provided it is capable of being appropriated literally or metaphorically by an individual. Such objects are flints, shells, claws, feathers, earth, salt, plants, manufactured articles, anything peculiar or unknown or not understood, trees, streams, rocks, and even certain animals, as the serpents of Whydah. It is enough for an object to be accidentally associated with an event for it to be regarded as the cause and even the author of that event, whence its elevation to the rank of a fetish. Fetishes may be natural or artificial. Artificial fetishes are either public, preserved by priests, or private, purchasable from them usually at a very high price. In some countries kings and princes have large collections of fetishes, and every family has at least one. They are hereditary, and either hung up in the dwellings or worn on the neck or elsewhere, and are even fastened on domestic animals. They are made to resemble the human form, and the public fetishes are sometimes of gold and very large. The worshipers provide their fetishes liberally with food, but if prayers are not granted they frequently maltreat them, throw them away or beat them to pieces. In connection with fetish worship there are festivals and sacrifices. For the latter the victims are oxen, swine and other animals; but sometimes, when the royal and priestly power are united in the sacrificer, criminals, prisoners or persons of the lowest classes of the tribe are immolated. The festivals — among which the Yam and Adai festival with the Ashantees, and the festival in honor of Khimavong, the god or divine messenger, are especially celebrated — are generally attended by excess in drinking, thefts, fights and gross licentiousness. It must, however, be observed that the limits of the term fetish have not yet been agreed upon, as some exclude from it the worship of forests, mountains, rivers, etc. In the luck tokens of gamblers and other superstitious persons there is an analogy to the fetish of the savage. (See FAMILIAR SPIRIT; WITCHCRAFT). Consult Denett, R. E., 'At the Back of the Black Man's Mind' (New York 1906); Jevans, F. B., 'Introduction to the Study of Comparative Religion' (New York 1908); Milligan, R. H., 'The Fetish Folk of West Africa' (New York 1912); Nassau, R. H, 'Fetishism in West Africa' (New York 1904).

FETOR, fē'tôr, a peculiarly offensive odor, usually considered to be due to some sort of animal putrefaction. Fetor of the breath may be due to sores of the tongue, cheeks or gums, to necrosis of the teeth or abscess of the teeth cavities, to poisoning of mercury and the sordes of scurvy. Diphtheritic and streptococcus inflammations of the throat cause bad odors that closely resemble fetor. Gangrene and abscess of the lungs cause the most persistent and penetrating fetor. In various diseases of the stomach and intestines accompanied by the absorption of products of putrefaction, fetor of the breath is common. Fetor of the feet is due to lack of porosity of their leather covering and to uncleanliness and excessive perspiration. These conditions result in a maceration of the skin and if infection with certain forms of bacteria takes place this macerated skin is apt to be infected with putrefactive bacteria and consequent upon this there is more or less fetor. The treatment of the condition consists in cleanliness, improvement of the foot-gear and antiseptic washes.

FETTERLOCK, or **FETLOCK,** a heraldic form of padlock. It was adopted by Edward IV of England in 1471.

FEU, fū', in Scots law, the holding of lands based on an annual rent of grain or money or on agricultural service; also, lands so held. This is the commonest form of land tenure in Scotland. It is, in effect, a sale for an annual payment, more resembling in form a copyhold estate than a freehold and is a relic of the feudal system, which prevails to-day to some extent in the alienation of land in Scotland. This system of tenure, in contrast with leasehold estates in England and elsewhere, has tended to encourage holders of land to erect and maintain buildings of a more substantial character.

FEU DE JOIE, a kind of musketry fire in celebration of some state festival. Troops are disposed in line, in two ranks and at open order. When the order to present arms is given care is taken that the rifle barrels are elevated at a uniform angle. Upon the command to fire the right-hand man of the front rank discharges his piece and is followed at scarcely perceptible intervals by the man on his left. When the extreme left of the front rank is reached the left-hand man of the rear rank fires and the second rank rifles are fired in turn until the right is again reached. Three rounds of such firing are fired on special occasions.

FEUCHTERSLEBEN, foik'ters-lā'bĕn, **Ernst,** Baron von, Austrian philosopher and poet: b. Vienna, 29 April 1806; d. there, 3 Sept. 1849. He was educated at the Thesesian Academy and at the University of Vienna, where he was graduated in medicine in 1833. He became a lecturer at the university and became dean of the faculty of medicine in 1844. He was on intimate terms with Grillparzer, Laube and other literary lights, took a deep interest in educational matters and in 1848 became under-secretary of state in the Ministry of Education. He wrote ‘Ueber das Hippokratische erste Buch von der Diät’ (1835); ‘Aerzte und Publicum’ (1848); ‘Lehrbuch der ärztlichen Seelenkunde’ (1845), of which a translation in English appeared; the poetical works ‘Gedichte’ (1836); and the ‘Zur Diätetik der Seele’ (1838, 50th ed., 1906); ‘Beiträge zur Litteratur—, Kunst— und Lebenstheorie’ (1841); ‘Geist der deutschen Klassiker’ (3d ed., 1866).

FEUCHTWANGER, foiHt'vang'-ĕr, **Lewis,** American chemist: b. Fürth, Bavaria, 11 Jan. 1805; d. New York, 25 June 1876. He early displayed a fondness for natural science and made that study a specialty at the Jena University. In 1829 he came to New York, where he opened its first German pharmacy. He soon won a reputation as a chemist, mineralogist and manufacturer of rare chemicals. He was the first to introduce the alloy, German silver, and unsuccessfully attempted to have it adopted by the government in place of nickel or copper for coinage purposes. His works are ‘Popular Treatise on Gems’ (1838); ‘Elements of Mineralogy’ (1839); ‘Treatise on Fermented Liquors’ (1858); ‘Practical Treatise on Soluble or Water Glass’ (1870); ‘A Handbook on Silex, etc.’ (New York 1871).

FEUD, fūd, a permanent condition of hostilities between tribes or families. It was common in northern Europe for many centuries and gave way very gradually before the introduction of law and order. It survives in the Italian vendetta and in the feuds of the mountains of Kentucky and Tennessee in America.

FEUDAL ARCHITECTURE, a term sometimes applied generally to the architecture of the feudal period and specifically to the military structures of that period. Of these the principal was the castle (q.v.).

FEUDAL SYSTEM. A fee, feud or fief is a possession, of which the vassal receives the right of use and enjoyment, of disposition and alienation, on condition of fidelity, that is, of affording assistance or counsel, and avoiding all injurious acts, together with the performance of certain services incident to the tenure while the feudal lord still retains a paramount right. A fief is distinguished from allodial possessions by the circumstance that it cannot be alienated without the consent of the feudal lord, by the services usually due from the vassal and by a peculiar kind of inheritance. The system originated among the German tribes and the nature of feudal property is explained by its origin. Such was the passion of the ancient Germans for war, that in time of peace private feuds took the place of public contention; and in default of these the men of military age spent weeks and months and years in adventures and made incursions into the territory of the neighboring tribes, or took part in the quarrels of the distant ones. In the expeditions of particular adventures against the adjacent tribes or the Roman provinces, their booty consisted of garments, arms, furniture, slaves. But when the northern hordes broke into the south and in the partition of the conquered lands large districts fell into the hands of kings or dukes and their subordinates, they gave certain portions of the territory to their attendants to enjoy the possession for life. These estates were called *beneficia* or fiefs, because they were only lent to their possessors, to revert after their death to the grantor, who immediately gave them to another of his servants. From this custom of the ancient Germans arose the feudal system and feudal service, which is purely German. As the son commonly esteemed it his duty, or was forced by necessity, to devote his arm to the lord in whose service his father had lived, he also received his father's fief; or rather, he was invested with it anew. By the usage of centuries this custom became a right; and to deprive one of his paternal fief, though it was prohibited by no law, seemed an act of injustice. This change took place between the 9th and 11th centuries. A fief rendered vacant by the death of the holder was at once taken possession of by his son, on the sole condition of paying homage to the feudal superior. In the case of ecclesiastical fiefs the right of succession belonged, under the same condition, to those who succeeded the last holders in their ecclesiastical office. The castle-fiefs, so called, were a peculiar kind of military fiefs, the possessor of which was bound to defend the castle belonging to his lord. The vassal who directed the defense was called, in the imperial fortresses, a burgrave. Thus the several orders of vassals formed a system of concentric circles, of which each was under the influence of the next, and all moved around a common centre, the king, as the supreme feudal lord. With military vassals another class arose. From the oldest times in the courts of kings and the governors whom they appointed, as well as in those of the bishops, were certain officers who at first performed active service, but were afterward rather a splendid appendage to the court. The four offices of the marshal, the chamberlain, the cup-bearer and the sewer, are the oldest and most honorable, but by no means the only ones; offices, on the contrary, were as numerous as the employments which could be devised at court. These officers, at a period when money was scarce and the old German notion in full vigor which considered none but landed proprietors as citizens and none but the owners of large estates as noblemen, were naturally rewarded by grants of land during the time of service; and these estates, like the military fiefs, but somewhat later, certainly not before the time of Frederick I (1152–90), became by degrees hereditary. The splendor of the court and the advantages accruing from these services induced many noblemen to solicit them. They became the first in the new class of servants or ministers which was thus formed; and under them there was a multitude of other servants, particularly on the estates of the nobility.

A refusal to perform feudal service, or any other violation of fealty, was styled felony. Upon this and other difficulties incident to feudal property, as in cases growing out of the succession, surrender, alienation or under-tenure of a fief, the lord decided in a feudal court, filled by vassals, who were required to be of equal rank with the accused. To appear in these courts at the summons of the lord of the manor and accept the place of an assessor there was reckoned among the duties incident to a fief. As the relations of lords and vassals (at that time one of the most important relations in life) became more and more widely spread and the number of vassals increased at the expense of the ancient immediate subjects of the empire, the latter were thrown into the background and at length nearly forgotten.

In the 10th and 11th centuries no duty due from subjects was known except feudal duties; the whole German Empire was one vast feudal possession and the idea of feudal lords and national sovereigns were wholly confounded. If any one was neither a lord nor a vassal he was scarcely looked upon as a citizen. Hence few rich landed proprietors ventured to rely upon their own strength, without a feudal connection. And even most of these at last yielded to the spirit of the age and became royal vassals. The emperor, likewise, used every means to induce them to adopt such a course.

From the feudal system, the only social organization of the European states in the Middle Ages, a new system of civil rank arose. The inferior nobility, a rank intermediate between the higher nobility (princes) and freemen, owes its origin, it is said, to this institution; and a regular scale of rank was formed among the vassals, without detriment, however, to the principle of equal birth. The king formed the first class; the spiritual princes, bishops and immediate abbots constituted the second; the lay princes, dukes, landgraves, margraves and immediate counts, the third; those barons, or rich landed proprietors, who owed fealty to no one, but yet, on account of their limited rights or possessions, were the vassals of the emperor, the fourth; those freemen who stood in the same relation to the princes, the fifth; the vassals of the former and the servants of the princes, the sixth; and the possessors of small fiefs, the seventh. Besides these ranks, after some centuries, the order of citizens was formed, as being included under no one of them. The spirit of the feudal system, grounded on the prevalence of landed property, was necessarily foreign to cities which owed their origin to industry and personal property and founded thereon a new sort of power. The principles of the feudal laws were developed and established by the Lombard lawyers of the 12th century. The collection of feudal laws and customs which is appended to the Roman code under the title of *Libri Feudorum* became the code of feudal law over a great part of Europe.

The feudal form of government, at a period when a spirit of independence and of opposition to despotism was abroad in the land, was well suited to put into the hands of one governor, as supreme feudal lord, the reins of the national power, to be employed against foreign enemies without endangering domestic freedom. But the purity and influence of feudal relations in time became less; and the strength of the national government declined amidst a spirit of disaffection and sedition, which became universal when nobles began to perceive that the feudal government was not naturally dependent on kings, but kings on it. Indeed, the sovereigns had no other security for their subjection than the feudal oath and the menaces of punishment, which the king might not have the ability to carry into effect, when his power was divided in most of his states, either by investiture or by the usurpations of the princes. Thus the vassals of the crown in Germany, Italy and the older districts of France succeeded in depriving the king of almost all power, even of the external honors of royalty; and never, in the two first countries and in France only after the extinction of the great baronial families, could he succeed in establishing a new authority independent of the feudal power. See MIDDLE AGES.

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FEUERBACH, foi'ĕr-bäн, **Anselm,** German painter: b. Spires, 12 Sept. 1829; d. Venice, 4 Jan. 1880. He studied at the art schools of Düsseldorf and Munich, and later at Antwerp and Paris. He worked at Carlsruhe, Venice, Rome and Vienna. His Roman period was productive of several splendid works, in which are apparent his close study of the Italian masters. He became professor at the Vienna Academy in 1873, but disappointed at the reception of one of his works resigned and removed to Venice. Among his principal works are 'Iphigenia' (Stuttgart); 'Dante at Ravenna' (Carlsruhe); 'Medea' (Munich); 'The Concert' (Berlin); 'The Battle of the Amazons,' 'Pieta' (Munich); 'Symposium of Plato' (Carlsruhe); 'Ariosto at Ferrara' (Munich).

FEUERBACH, foi'ĕr-bäн, **Ludwig Andreas,** German philosopher: b. Landshut, Bavaria, 28 July 1804; d. 13 Sept. 1872; the fourth son of the illustrious jurist, Paul Johann Anselm Feuerbach. After a secondary education he studied divinity at Heidelberg and Berlin, but fell under the sway of Hegel and took his doctor's degree in philosophy. After a brief period as *privatdozent* in Erlangen, he became *persona non grata* on account of an heretical pamphlet embodying 'Thoughts on Death and Immortality.' From a follower of Hegel he developed rapidly into an out-and-out freethinker and democrat. Besides a more technical 'History of Modern Philosophy' and a monograph on Leibnitz he wrote reviews and essays for the most radical periodical of the time, Arnold Ruge's *Jahrbücher*. In 1841 appeared his most significant work 'The Essence of Christianity' (translated by George Eliot), which won him a place among the foremost advanced thinkers of the day. He entered into correspondence with Karl Marx and is indeed regarded by Socialists as a precursor of their classic authorities. He sympathized with the revolutionary uprising of 1848 but took no active part beyond delivering a course of lectures to the Heidelberg students on the «Essence of Religion.» During the dark period of reaction his prestige waned but he continued his researches into the nature of religion, producing in 1857 the 'Theogonie,' in which unfulfilled desire was defined as the core of religious feeling. Financial failure threatened him in 1860, but the loyalty of his friends saved him from actual want and in the last few years of his life he was once more able to attack in a volume on 'God, Freedom, Immortality,' the religious problems to which he had so persistently devoted himself.

Feuerbach was not a systematic philosopher and became progressively more averse to metaphysics, developing an affection for the methods of natural science and a popular, vivid style, though at times marred by diffuseness and dithyrambs. As an absolutely honest and uncompromising champion of free-thought and political liberalism he exerted a tremendous influence both on Socialists and natural scientists of the materialistic school. He has been appropriately compared to a powerful ferment. Richard Wagner, Ferdinand Lassalle and Gottfried Keller are among those who were deeply stirred by his writings. Feuerbach's philosophy of religion is remarkable for the bold assumption of a purely psychological point of view, while historical problems and social factors (as Marx pointed out) are ignored. The neglect of concrete historical conditions distinguishes his method of approach from that of Strauss, while his concentration on individual psychology required supplementing by modern sociological and ethnological considerations. Nevertheless, the insistence on the purely human rather than metaphysical aspects of the problem marked an epoch-making departure in the history of the subject. His essays on 'The Necessity of a Reformation of Philosophy,' 'Preliminary Theses,' and 'Principles of a Philosophy of the Future' (1842–43) are remarkable anticipations of modern pragmatism with the emphasis on democratic aspirations.

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Robert H. Lowie,
American Museum of Natural History.

FEUERBACH, Paul Johann Anselm von, powl yō'hän än'zelm fon, German jurist and criminal law reformer: b. Hainichen, near Jena, 14 Nov. 1775; d. Frankfort-on-Main, 29 May 1833. He was professor at Jena (1801), Kiel (1802), Landshut (1804); planned a new penal code for Bavaria, which was enunciated in 1813, and was subsequently adopted by other governments. He was later president of the Court of Appeals at Anspach. Among his best-known works are 'Critique of Natural Law' (1796); 'Anti-Hobbes' (1798); 'Lehrbuch des gemeinen in Deutschland geltenden peinlichen Privatrechts' (1801); 'Merkwürdige Kriminalrechtsfälle' (1808–11); 'Kaspar Hauser: An Instance of a Crime Against a Soul' (1832). His works rendered notable service in the humanizing of judicial punishment and in paving the way for a psychological treatment of criminal cases.

FEUILLANTS, fė-yoṅ, in ecclesiastical history, a religious order clothed in white and going barefoot, and a branch of the Cistercians. Their name was derived from an abbey, founded about 1145 in the diocese of Rieux and called first Fuliens, later Les Feuillans. In 1577 the abbot, Jean de la Barrière, introduced reforms in order to weed out the relaxations which had crept in, and from then on the Feuillants lived under the strict observance of the rule of Saint Bernard. In 1589 they were established as a Separate Congregation by a brief of Pope Sixtus V, who two years before had given them a church in Rome. In the same year, 1587, King Henry III of France also built a monastery for them in Paris. In 1595 Clement VIII deprived the Cistercians of all control over the Feuillants. A second monastery was given to them in Rome in 1598. Pope Urban VIII in 1630 decreed the separation of the French and Italian branches of the order; the former continued to be known as Feuillants; the latter were called reformed Bernardines and finally combined with the order of Cêteaux. At the outbreak of the French Revolution the order had 24 abbeys in France. These were suppressed in 1791, a fate which was also suffered by the convents of nuns, known under the name of Feuillantines because they had embraced the same rules after the first of them had been established in 1588 by Jean de la Barrière. The Paris monastery was taken possession of by a club celebrated in the political history of France under the name of the Feuillants. It was a weak rival of the Jacobin Club, and fell before the clamor of a mob in March 1791.

FEUILLET, Octave, ŏk-tāv fė-yā, French novelist and dramatist: b. Saint Lô, Manche, 11 Aug. 1821; d. Paris, 29 Dec. 1890. Between 1848 and 1858 he gained a good deal of notice with his novels and a series of comedies and tales, some of which were published in the *Revue des Deux Mondes*. In 1857 the appearance of ‘Le Roman d'un Jeune Homme Pauvre’ raised Feuillet to first rank of the novelists of the day, and it was immediately dramatized by the author himself. Next followed ‘Histoire de Sibylle’ (1862), and in the year in which it appeared Feuillet was elected to the French Academy. Among his other numerous novels are ‘Monsieur de Camors’ (1867); ‘Julia de Trécœur’ (1872); ‘Un Mariage dans le Monde’ (1875); ‘Le Journal d'une Femme’ (1878); ‘Histoire d'une Parisienne’ (1881); ‘La Morte’ (1886); ‘Le Divorce de Juliette’ (1884); ‘Honneur d'Artiste’ (1890). His works have a refined humor, and are free, especially the earlier, from coarseness. He was a master in depicting the fine shades of emotion and character; his creations are distinctly individualized, his society women being remarkably lifelike; his later works are marked by a growing cynicism of outlook. His dramas met with considerable success, but they are on the whole inferior to his novels and have not survived. Feuillet's ‘Theatre Complet’ appeared in 1892–93. Consult Deries, L., ‘Octave Feuillet’ (Saint Lô 1902).

FEUILLETON, fę'yę-tôṅ («leaflet»), the literary section of a French newspaper, usually appearing on the lower portion of the first page. It includes essays, criticisms and fiction, the latter of the serial type. In America the so-called «magazine section» of a daily paper corresponds to the feuilleton. Bertin the elder invented the system in France.

FÉVAL, fā-väl, **Paul Henri Corentin**, French novelist: b. Rennes, 28 Nov. 1817; d. Paris, 8 March 1887. He first studied law and was admitted to the bar of his native city, but soon went to Paris unable to resist his desire to write. His first story, ‘Club des phogues’ (1841), and others, having given him some note, he was offered a large sum to write, under the pseudonym «SIR FRANCIS TROLOPP» (as though an Englishman), a sensational story ‘The Mysteries of London,’ after the manner of Sue's ‘Mysteries of Paris.’ It was done in 11 volumes (Paris 1844), was immensely successful, widely translated and put on the stage. He remained a very fertile, spirited and popular writer, often dramatized, with long runs and left more than 200 volumes from his pen. Especially successful were ‘Le Loup Blanc’ (Paris 1843, London 1847); ‘Les Amours de Paris’ (Paris 1845, London 1856); ‘La Quittance de Minuit’ (Paris 1846); ‘Le Fils du Diable’ (Paris 1847); ‘Histoire des Tribunaux Secrets’ (8 vols., Paris 1851); ‘Compagnous du Silence’ (Paris 1857); ‘Mme. Gil Blas’ (Paris 1857); ‘Le Bossu, ou le Petit Parisien’ (Paris 1857, London and New York 1863); ‘Jean le Diable’ (Paris 1868); ‘Les Merveilles du Mont Saint Michel’ (Paris 1880). During most of his life a freethinker, he was later converted and became an ardent Catholic. As a result he revised his works and issued a collection of them in 44 volumes (Paris 1877–83). After his death a new edition of his collected works was brought out (38 vols., Paris 1895). In spite of his many successes and the big editions through which many of his books went, he spent the latter years of his life in comparative poverty, having twice lost, through unwise investments, a large fortune. Consult Buet, C., ‘Paul Féval, Souvenirs d'un Ami’ (Paris 1887); Delaigue, A., ‘Un Homme de Letters, Paul Féval’ (Paris 1890); Mirecourt, E. de, ‘Paul Féval’ (in ‘Les Contemporains,’ Paris 1857).

FEVER, a condition in which the temperature of the body is above normal. The average daily range of temperature in men is from 98° to 99° F., and in women from quarter to half a degree higher. In children temporary elevation even as high as 100° F. may occur from conditions of excitement and from over-exercise, but this should not be termed fever. Slight daily variations in temperature are usual. Thus the maximum temperature occurs usually from 5 to 9 P.M. There is then, as a rule, during sleep a decrease until a minimum is reached, some time between 2 and 4 A.M. It is probable that diminished muscular activity and lessened food absorption are responsible for much of this variation. Temperature usually rises during strong muscular exercise and also after a meal. These slight rises are balanced by heat-loss from increased perspiration. The temperature of man in the tropics and in the Arctic zone does not vary more than 1° C. (For discussion of bearable extremes of heat and cold, heat-production, heat-loss and the nervous mechanism that controls the general phenomena, see ANIMAL HEAT).

Modern pathology teaches that fever is the index of a reaction of the human body in its struggle with some foreign invader and is brought about by excessive oxidation and diminished heat-loss. Fever is usually accompanied by an increase in the number of respirations, by an increased number of contractions of the heart, raised pulse-rate, an increase in the blood-tension in the blood vessels and by other symptoms of general malaise. These are headache, dry mouth, dry skin and at times increased mental excitement. Fever from this point of view is a conservative process and is nature's own method of overcoming some form of infection or intoxication. Fever as a general process should be distinguished from the many special kinds of so-called fevers that are described. Thus the term fever as used in typhoid fever, scarlet fever, lung fever, etc., is a relic of earlier medical teachings, in which the rise in temperature was considered the essential part of the disease. It is now recognized that fever is only one of the features in the general history of the development of the disease-process. The height of the temperature during fever may vary considerably. If the temperature is not above 100° F. (37.7° C.), it is spoken of as light fever; when between 100° and 103° F. (37.7° and 39.4° C.) it is called moderate fever; between 103° and 105° F. (39.4° and 40.5° C.) it is spoken of as high fever; while above 105° F. (40.5° C.) hyperpyrexia is the term that is applied. Temperatures as high as 110° F. have been recorded in patients who have recovered. The course of most fevers is, for purposes of convenience, divided into (1) the initial stage, which usually starts with chilliness and often with a distinct chill; (2) the hot stage, when the temperature has risen and is at a fairly constant normal, during which the blood vessels at the surface are dilated, the skin is flushed and feels hot and dry; this condition perhaps lasting a few hours, or it may be several weeks, according to the disease-processes that produce it; and (3) the terminal stage. This may be ushered in by a previous perspiration, with sometimes increased urination and prompt subsidence of the temperature; or the temperature may slowly sink to normal by a process of lysis. Each type of disease-process manifests its own peculiar temperature-variation and the study of temperature-curves is extremely important in the determination of the disease.

Fever results not so much from an increase in the heat-production alone, but in a disturbance of the heat-regulation or thermotaxis for it is perhaps true that the amount of heat produced by an athlete in a mile run is vastly greater than that produced throughout the entire four weeks of a severe typhoid fever yet the heat-loss keeps pace in the runner with the heat-production. It is the relation between these two factors that is disturbed in *fever*. Fever is largely a conservative process and a moderate degree of temperature is believed to be rather beneficial than harmful. The real danger in fever is not the temperature, unless it is excessively high — from 104° to 105° F.— but it is the poison that is being made in the body, either by perverted metabolism or by bacterial or chemical intoxication. Therefore, in the treatment of disease with rise in temperature the reduction of the fever is not the only point to be attained. During fever there is increased oxidation, increased elimination of uric acid, diminution of most of the secretions, notably the saliva, the gastric juice, the bile and, save in the terminal stages, the sweat. The kidney-secretion is also decreased during the hot stage, because more water is being lost through the skin and lungs than usual. Changes in the blood are constant and usually consist in an increase in the number of leucocytes, or white blood-cells. High temperatures may produce degeneration in a number of tissues of the human body. The most important ones are those of the nerve-cells. These changes may take place if the temperature gets above 105° F., and even lower temperatures acting for a very long time may cause serious structural changes in the nervous system. The treatment of fever, as has been indicated, should mean the treatment of the disease that is causing the fever and will be considered under each particular topic of fever. (See MALARIA; MENINGITIS; PATHOLOGY; RELAPSING FEVER; SCARLET FEVER; TYPHOID FEVER; TYPHUS FEVER; YELLOW FEVER). Consult Hektoen, 'American Text-book of Pathology' (1901); Schäfer, 'Text-book of Physiology' (1900).

FEVER-BUSH (*Benzoin benzoin*), an American shrub of the laurel family (*Lauraceæ*). It grows from 4 to 20 feet high, in moist woods and along streams from Massachusetts, through Ontario, to Michigan, south to Kansas, and eastward to North Carolina. An infusion of the sweet-smelling bark is used as a tonic in fevers. The bright berries of the tree, ripe in August and September, are sometimes ground and used as spice, for which reason it is locally called spice-bush or wild allspice. It is also known as Benjamin-bush. The name fever-bush is also applied to the *Ilex verticillata*.

FEVERWORT (*Triosteum perfoliatum*), a perennial of the honeysuckle family (*Caprifoliaceæ*), a native of North America, where its dried and roasted berries have been occasionally used as a substitute for coffee; its roots act as an emetic and mild cathartic. The plant grows in rich soil from Quebec westward to Minnesota, and south to Kansas, Kentucky and Alabama. It has a number of common names, and is known locally as fever-root, horse-gentian, wood ipecac, tinker's root, wild coffee, etc.

FEWKES, fūks, **Jesse Walter**, American anthropologist: b. Newton, Mass., 14 Nov. 1850. He was graduated from Harvard in 1875, took degrees A.M. and Ph.D. in 1877; University of Arizona, LL.D. 1915. Studied with Louis Agassiz at Penikeese in 1873, and was for 10 years at the Maine Laboratory of Alexander Agassiz at Newport, R. I. He was assistant curator of the Museum of Comparative Zoology, Cambridge, Mass., 1880–89; and has been ethnologist of the Bureau of American Ethnology, Smithsonian Institution, since 1895. He has written extensively on marine zoology, ethnology and archæology of American Indians. He was editor of the *Journal of the American Ethnology and Archæology* 1881–94; and was in charge of the excavations of the Casa Grande in southern Arizona, Spruce-tree House, Cliff Palace and Sun Temple in the Mesa Verde National Park, Colorado. He is member of many ethnological societies, including the American Society, American Academy of Arts and Sciences and National Academy of Sciences; Knights of Isabella the Catholic, and recipient of a gold medal from King Oscar of Sweden for researches in anthropology.

FEYD, John. See FYT, JOHN.

FEYEN, fā-yăn, **Eugène**, French painter: b. Bey-sur-Seille, Meurthe-et-Moselle, France, 13 Nov. 1815; d. 1908; one of the many successful pupils of Paul Delaroche. While he began as a painter of portraits and of the nude, he gradually drifted into genre subjects, which were evidently congenial to his talent, and his pictures of the seaside and the fisher folk are distinguished for clever composition and refreshing color. 'The Harvesters of the Sea' (1872, in the Luxembourg); 'The Bay of Cancale' (1885); and 'The Sailor's Sweetheart' (1890) are his best works. He was created a chevalier of the Legion of Honor in 1881.

FEYER-PERRIN, få-yā-pĕ-răṅ, **François Nicolas Augustin,** French painter: b. Bey-sur-Seille, Meurthe-et-Moselle, 1829; d. Paris, 14 Oct. 1888. He began his career as an artist in the drawing school at Nancy and subsequently attached himself to the studios of Cogniet and Delaroche at Paris. At first he hesitated in choosing a specialty between subjects of poetic allegory, genre subjects, or varying race type, or historic painting. Since 1864 he has confined himself to painting the scenery and people of the seashore, especially in Brittany. His work has been successful, because it is distinguished by poetic feeling, delicate characterization and transparently brilliant coloring. His most famous pictures are in the Luxembourg, namely, 'The Return from Oyster-fishing' (1874) and 'The Fisher-girls of Cancale at the Spring' (1873).

FEYJOO Y MONTENEGRO, Benito Jerónimo. See Feijoo y Montenegro, B. J.

FEZ, Morocco, city, capital of the province of Fez, 95 miles from the Atlantic, 225 northeast of Morocco. Fez is a city whose ancient glories have departed. The walls which encircled it have gone to ruin, and its curiously contracted thoroughfares are ill-kept, dirty and sunless. In place of its reported population of 400,000 in its palmy days it has dwindled to a fourth of that number. It contains over 100 mosques, one of which, El Carubin, has a covered place for women who may choose to participate in public prayers, something unusual in Mohammedan places of worship. Good public baths are numerous. It is the entrepôt of northwest Africa for goods of European manufacture. Its chief manufactures are leather and silk shawls and it was at one time the seat of a trade in red caps (fez), the dye for which was almost exclusively obtained here. Twice a year caravans go from Fez across the desert to Timbuktu. Fez has always been considered one of the chief seats of Moslem learning. Old Fez was founded in 793 by Edris II, a descendant of Mohammed, and continued the capital of an independent kingdom till 1548, when it was, together with its territory, conquered and annexed to Morocco. For upward of a thousand years Fez has been one of the sacred places of Islam. When the pilgrimages to Mecca were interrupted in the 10th century, the western Moslems journeyed to this city, as the eastern did to Mecca; and even now none but the Faithful can enter Fez without express permission from the emperor. Pop. (estimated) 100,000.

FEZ, fĕz, **Kingdom of,** once independent, but now the most northern section of the empire of Morocco; bounded north by the Mediterranean; east by Algeria; south by the river Om-er-begh or Morbeza, which separates it from Morocco proper; and west by the Atlantic. It was conquered and united to Morocco in 1548. See Morocco.

FEZ, a red, brimless cap, usually of felt or wool, first made in the town of Fez, Morocco. It is the Turkish national headdress, but is also found in Greece, Egypt, the Balkan states and Persia.

FEZZAN, fez-zän', Africa, political division of the Italian province of Tripoli. The capital is Murzak; area about 156,200 square miles. In the northern part are low mountains, or hills, one of which, Jebel-es-Sudah, or Black Mountain, is composed largely of basalt. Sandy plains and a few fertile valleys are in the southern part. There are no streams of water and but few natural springs; but good water may be obtained at a depth of from 10 to 12 feet. There are a few small lakes, usually covered with a thin crust of carbonate of soda. Rain seldom falls; in some places years intervene between the short periods of rainfall. Jackals, gazelles and foxes, the ostrich, vulture and falcon are found in the hills. The manufactures are coarse linen and cotton goods and some ornamental articles made from gold and silver. Trade with neighboring cities is carried on by means of caravans. As Phanazia, Fezzan was held by the Romans after 19 B.C. It was afterward independently ruled as a Christian state; was conquered by the Arabs and reverted to Mohammedanism; in the 16th century it fell under Turkish domination, and became a lieutenant-governorship in 1835. After the war between Italy and Turkey in 1911–12, it was, under the Treaty of Ouchy, placed with Tripoli, under the control of the former power. Pop. (estimated) 70,000, consisting of Tuaregs, Arabs, Moors, and Negroes.

FIACRE, fyä'kr', or **FIACHRA, Saint,** Irish monk of the 7th century. He was of noble family, became an anchorite and went to France. He was kindly received by Saint Faro, bishop of Meaux, to whom he indicated his desire to live as a hermit. The bishop assigned him a part of the forest of Brodolium (Breuil), in the province of Brie. There he built a monastery with a guest house, where he gave refreshment to wayfarers in that region. He acquired a reputation for miracles and his remains were long venerated at the monastery he had founded. In 1568 they were transferred to the cathedral of Meaux, where his shrine is still to be seen. In the ecclesiastical calendar he is commemorated on 30 August. He is the patron of Brie and the protector of gardeners. French public cabs were first provided by the proprietor of the Hotel Saint Fiacre, Rue Saint Martin, Paris, in 1640. From this circumstance all public vehicles came to be called *fiacres*. Consult O'Hanlon, J., 'Lives of the Irish Saints' (Vol. VIII, 1875–1904).

FIALA, fē-ä'la, **Anthony,** American explorer: b. Jersey City Heights, N. J., 19 Sept. 1869. He was educated at Cooper Union and the National Academy of Design, New York. He began business life as stone artist and designer in lithography, was for five years assistant in a physical and chemical laboratory and in 1890 became a newspaper artist and cartoonist. He studied the processes of photo-engraving and photo-gravure, installed a photo-engraving plant for the Brooklyn *Daily Eagle* in 1894 and was in charge of the art and engraving department of that journal from 1894 to 1899. He served in Troop C, 1st New York Volunteer Cavalry during the Spanish-American War, acting meanwhile as war correspondent for the Brooklyn *Daily Eagle*. He was photographer to the Baldwin-Ziegler Polar Expedition in 1901–02 and was commanding officer of the Ziegler Expedition of 1903–05, which penetrated to 82° 4′ North. This expedition surveyed the Francis Joseph Archipelago, but the ship was lost. A relief party was sent out and Fiala was found at Cape Dillon in July 1905. He accompanied ex-President Roosevelt on his trip through the Brazilian wilderness in 1913–14, explored the Papagaio River and descended the Jurnena and Tapajos rivers of Brazil. He published 'Troop «C» in Service' (1899) and 'Fighting the Polar Ice' (1906).

FIAT, fī'at, an order of a judge or of an officer whose authority, to be signified by his signature, is necessary to authenticate particular acts; a short order or warrant of the judge, commanding that something shall be done. See 1 Tidd, Pr. 100, 108. Fiat in bankruptcy, in English law, was an order of the lord chancellor that a commission of bankruptcy should issue. Fiats in bankruptcy are abolished by 12 and 13 Vict. c. 116.

FIAT MONEY, money made legal tender solely by fiat or decree of the government. Such money is not based upon bullion, coin or an intrinsic value, and no provision is made for its conversion into specie. Such money was issued by the American colonies and the term was again applied to the irredeemable paper currency during the greenback controversy in the late sixties and early seventies.

FIBICH, fē'bĭk, **Zdenko,** Bohemian composer: b. Vseboric, 21 Dec. 1850; d. Prague, 10 Oct. 1900. He studied at Leipzig under Moscheles, Richter and Jadassohn in 1865–67, studied a year in Paris and also under Lachner at Mannheim. He settled as a teacher at Vilna in 1870 and six years later was appointed conductor at the National Theatre, Prague. In 1878 he became chorus master of the Orthodox Church at Prague but resigned three years later to devote himself to composition exclusively. He takes a foremost place among the composers of his race. He was very prolific, producing in all about 700 works, including the operas 'Bukovín' (1874); 'Blanik' (1881); 'Die Braut von Messina' (1884); the trilogy 'Hippodamia' (1891); 'Tempest' (1895); 'Sarka' (1898); 'Der Fall Arconas' (1900); the symphonic poems 'Othello'; 'Toman and the Nymph'; 'Vesna'; 'Zaboj'; 'Slavoj and Ludék'; 'Vigilæ,' also several symphonies, choral works, pieces for piano, songs, etc. Consult Richter, C. L., 'Zdenko Fibich' (Prague 1899).

FIBIGER, fē'bĭ-gėr, **Johannes Henrik Tauber,** Danish poet and clergyman: b. Nykjöbing, 27 Jan. 1821; d. 1897. He wrote dramas founded on biblical history: 'Jephtha's Daughter' (1849); 'Jeremiah' (1850); 'John the Baptist' (1857); also a few secular tragedies, the most notable among them being 'Cross and Love' (1858) and 'The Everlasting Struggle' (1866), which has been very popular; and a narrative poem in 16 cantos, 'The Gray Friars' (1882).

FIBONACCI, fē-bō-nä'chē, **Leonardo,** called **LEONARDO PISANO,** Italian mathematician: b. Pisa about 1180; d. about 1228. Little is known of his life except from his writings, which were collected 1857–62 by Prince Boncompagni and include 'Liber Abaci' (1202); Practical Geometriæ' (1220); 'Liber quadratorum' (1225); 'Flos'; 'A Letter to Theodore.' He traveled in Egypt, Syria, Greece, Sicily and elsewhere, placing himself wherever he journeyed in communication with the leading mathematicians of the region visited. The 'Series of Fibonacci,' sometimes called the 'Series of Lame,' is as follows: 0, 1, 1, 2, 3, 5, 8, 13, 21, 34 — each term being equal to the sum of the two which precede it, indicated algebraically as $\frac{U}{n+2}=\frac{U}{n+1}+\frac{U}{n}$ and having several other remarkable characteristics important in higher arithmetic.

FIBRE. In the commercial sense the unmodified term «fibre» signifies the vegetable tissues used in the arts, and does not include the animal fibres, such as wool, hair and silk, which are classed as textile fibres, along with, however, several of the vegetable fibres, as cotton, linen, ramie, etc. Vegetable fibre is derived from the cellular structure or tissue of plants, the cells of which vary in diameter from one three-hundredth to one five-hundredth of an inch, the smaller sizes admitting of 125,000,000 cells to a cubic inch. The walls of these cells are composed of a substance of starch-like chemical composition, called cellulose, enclosing the living element of the plant, known as protoplasm. There are three forms of cells, simple cells, woody cells and ducts. Woody fibre is formed by the lengthening and thickening of simple cells. The ducts or vessels are large cylindrical cells whose walls have been absorbed and broken away. Wood cells consist of tubes one or two thousandths of an inch in diameter, their ends pointed and overlapping, so that when detached they form a continuous thread of cell structure of fibre proper, such as a filament of flax; and when they occur in the bark of dicotyledonous plants, or exogens, they are known as *bast* fibre. In monocotyledons, like the palms, and the century plant, the fibrous cells are built up with vessels into a composite structure known as «fibrovascular bundle.» These bundles of elongated, thickened cells pressed firmly together, and often embedded in soft cellular tissue, constitute, so to speak, the bones or structural part of the plant, and are called *structural* fibres, sisal hemp being an example. Even the common or simple cells form a valuable fibre material when they are produced on the surfaces of the leaves, stems and seeds of plants, in the form of hairs. This form of fibrous substance is known as *surface* fibre, cotton being an example. In this instance the hairs envelop the seeds produced in the boll or capsule. The «down» on the stems and surfaces of the leaves of plants is another example.

The term fibre is also given to other forms of vegetable growth where the fibrous material is not employed in the form of detached filaments, like flax sisal and cotton. The stems and twigs, and even wood of exogenous trees, divided into splints and used for basket-making are designated as fibre; and in like manner the stems and leaves of endogenous plants split or used entire, as rattan, or when coarsely subdivided for plating into such articles as hats, mats, etc., are also classed commercially as fibre. The stripped epidermis of palm leaves, such as the raffia of commerce, is considered fibre, yet it is not in any sense filamentous. Even some species of mosses, marine weeds and fungous growths, on account of their economic employment, are regarded as fibre substitutes, and are mentioned in the category of fibres. In general terms, however, «fibre» is composed of bundles of bast or fibrovascular tissue in the form of long flexible filaments, such as flax, hemp or manila; or of hairs, such as cotton, capable of being twisted or spun into yarns or threads, to be manufactured into fabrics or cordage.

The following classification illustrates the different forms of fibrous material recognized by experts and shows the positions of the different fibres in their relations to each other:

All fibrous material is classed in two grand divisions: A, Fibrovascular structure and, B, simple cellular structure. A is again divided into three groups: (1) Bast fibres; (2) Woody fibres, and (3) Structural fibres; B is divided into two groups, (4) Surface fibres and (5) Pseudo-fibres or false fibrous material.

1. The bast fibres are derived from the inner fibrous bark of the stems of dicotyledonous plants and are composed of bast cells, their ends overlapping to form in mass a continuous filament. Their utility is to give strength and flexibility to the tissue.

2. Woody fibres may be: (a) the stems and twigs of exogenous plants, or (b) the roots of exogenous plants entire, or subdivided into withes for use in basketry or a rough kind of cordage, or for coarse thread for stitching and binding (as in canoe manufacture); or (c) the wood of exogenous trees reduced to layers or splints, for baskets, or for excelsior; or (d) the wood of certain exogenous trees reduced to pulp for paper.

3. Structural fibres are derived (a) from the structural system of the stalks, leaf stems and leaves of monocotyledonous plants (as the agaves and palms) occurring as isolated fibrovascular bundles, surrounded in nature by a pithy, spongy, corky or often soft cellular mass, covered with a thick epidermis. They give the plants rigidity and also serve as water ducts; or (b) the entire stems or leaves of the same plants, simply split or shredded (such as straw plait); or (c) the fibrous portions of the leaves or fruits of certain exogenous plants when deprived of their epidermis and soft cellular tissue (the vegetable wool from pine needles).

Under division B, simple cellular structure, the (4) Surface fibres are recognized as (a) the hairs surrounding the seeds or seed envelopes of exogenous plants, and usually contained in a pod or capsule (as cotton); (b) hair-like growths, or tomentum, produced on the surfaces of stems, leaves or leaf-buds of plants (as pulu); or (c) fibrous material produced in the form of epidermal strips from the endogens (as raffia). The (5) Pseudo-fibres, strictly speaking, are not simple fibres, but fibrous material employed as substitutes for the true fibres. These are: (a) certain mosses, used as packing substances; (b) certain leaves and marine weeds, also used for packing; (c) seaweeds wrought into fish-lines or cordage, and (d) fungus growths employed in some of the economic uses to which true fibres are put.

A review of the uses of fibres in the arts, by man, shows seven general classes of economic employment, each of which may be subdivided further to illustrate special utility.

1. **The Spinning Fibres** enter into the highest forms of manufacture, such as the production of cloth and woven or netted fabrics, and they also include the cordage fibres. Among spinning fibres those for the production of fabrics naturally are the most important commercially. The fibres of the first rank, which enter into fine and coarse textures for wearing apparel, house furnishings, awnings, sails, etc., are chiefly cotton, flax, hemp, ramie, pineapple fibre and the finer manila hemps; those of the second rank, jute, coconut fibre or coir; and some of the agaves which find use in burlap or gunny, webbing, rough sacks, coarse floor coverings, etc. The netting fibres, also included in the spinning fibres, are derived from a very much wider range of plants, many of which are not in cultivation. Besides cotton, flax and ramie, employed chiefly in laces and knit goods, nets, etc., there are scores of tree basts, agave, palm and grass fibres which find use, both commercial and native, in the manufacture of all kinds of nets, hammocks and similar articles. A third group of the spinning fibres comprises those employed in cordage manufacture. They include all of the fabric fibres mentioned above, the so-called hard fibres, Manila and sisal hemps, coir, etc., as well as Sunn hemp, Mauritius hemp, the bow-string hemps, New Zealand flax and Tampico, used for making twines, and many forms of fibre used in the hand manufacture of rope and by natives in their rude domestic economy.

2. **Tie Material.**— The fibres employed as tie material are legion; many of them can scarcely be called commercial forms as they are used only by the natives in the countries where they are produced. The tie material is usually the peeled bark of trees rich in bast, stripped or shredded palm leaves, the tougher grasses, and even twigs and roots used with no special preparation, but merely twisted when green, or freshly cut, into rough cordage for the building of huts, enclosures and even for constructing rope suspension bridges. Raffia, used by nurserymen as a ready-to-hand tying material, is an example.

3. **Natural Textures.**—These are the nature-woven fabrics of tropical countries, which are used as substitutes for cloth, and which are prepared by simply stripping from the plant, in sheets or layers of fibrous substances, and beating. The Tappa or Kapa cloth of the Pacific Islands is an example. Others are the lace barks, the satin-like Cuba bast, employed in ladies hats, the ribbon-like bast used for cigarette wrappers, etc.; also the fibrous sheaths from the bases of the leaf-stalks of certain palms. The separated and hand-twisted filaments of many of these cloth substitutes are also used for rough cordage.

4. **The Brush Fibres.**— These include such commercial forms as Tampico, Palmetto, Palmyra, Kitool, Monkey Bass, Piassaba and cocoa fibre, employed in the manufacture of brushes, and as substitutes for animal bristles as well as the coarser forms, such as broom-corn, broom-root and even twigs and splints as employed in street-sweeping machines.

5. **The Plaiting and Rough Weaving Fibres.**—This is another large group, which includes many kinds not to be classed as commercial, yet of greatest importance to the natives of the countries where they grow. They are employed in articles of attire and ornament and for

use in the domestic economy. The most important commercially are the straw-plaits from wheat, rye, barley and rice straw (the Tuscan and Japanese braids). Other forms are split from palm leaves, such as *Carludovica palmata,* used in weaving Panama hats; plaits are also produced from various fibrous substances used entire, as the tree basts, and even thin shavings of close-grained woods — the «chip» in millinery trimmings. This group also includes the commercial matting fibres produced from grasses and sedges, as well as thatch materials of every description. The basketry fibres are likewise classed in this group, and they are legion, for they include not only the entire range of palm fibres, the grasses, reeds and rushes, yucca fibre, the leaf stems of ferns, etc., whole or split, but osier and splints from the common woods, pine, ash, hickory and others. Then there are many miscellaneous uses such as for «willow ware» furniture, chair seats, screen panels, etc., employing bamboo, osier, rattan, rushes and splints.

6. **The Filling Fibres** are of less importance than any of the preceding, though altogether they form a large group and include some valuable commercial forms. Their most common employment is in upholstery; wadding, from cotton; feather substitutes for filling pillows and cushions, as the silk cottons («vegetable silk»), «downs,» kapok and fibrous material from the surfaces of leaves and stems of plants or from their capsules or fruit; mattress and furniture filling, as tow or waste of the spinning fibres (flax, etc.), unprepared basts, straw and grasses; the curled hair substitutes or Spanish moss, Crin végétal, corn husks and others. Oakum for caulking ships, the leaves of reeds or flags used for filling the seams in casks, as well as the fibres used for stiffening mortar, or the staff used in exposition buildings, are included in this category, palmetto fibre and New Zealand flax being examples. Many fibres and fibrous substances are used as packing material, but they need not be enumerated.

7. **Paper Materials.**— This group of fibres might include the whole category of fibrous substances, for there is scarcely a fibre that cannot be made into paper, the expense of preparation being the main question in determining its availability. The *Textile papers* employ the spinning fibres, in the raw state, in the form of waste, tow, jute butts, old manila rope, cotton and linen rags, etc. The *Bast papers* include such Eastern fibres as Japanese paper mulberry, the tree basts, etc. The *Palm papers* are made from palmetto, yucca and many of the tropical palms. The *Bamboo* and *Grass papers* include bamboo, esparto and other grasses, straw and maize; and lastly, the *Wood pulp papers* are made from the cellulose, chemically prepared, from spruce, poplar and other native woods.

The employment of fibre in the domestic economy must go back to the most primitive times, for among the uncivilized races of man the world over we find a dependence upon fibre plants for utensils, cordage, clothing, the building and furnishing of their huts, second only in importance to their dependence upon edible plants for food. And these plants supply hundreds of fibres which the inventive genius of the age cannot afford to use commercially. So we have two great groups of fibres, economically speaking. The «native» forms used to supply the common wants of the people of the countries where they grow and the fibres recognized as commercial forms because they have been found best adapted to certain uses in the industrial world and have a stated market value. Some of these have come down to us from remote ages, and the larger number long ago established their places because they were proved to be the best for the purposes for which employed, a veritable survival of the fittest. The discovery of many new fibres therefore is hardly a possibility, although we may discover new uses for well-known forms hitherto not largely employed for any purpose. But even such fibres will scarcely find a place among the fibres of first rank, but must fill the places of the better and fully recognized commercial forms as substitutes, and therefore are worth less money.

While the «native» or emergency fibres, that are known, make a list of upward of 1,500 species, the commercial fibres of value to the world would hardly reach two score in number, and those that interest the United States scarcely half that number. Altogether, counting the more unimportant forms, 25 to 30 species may be enumerated, the larger number of which figure as imported kinds, although they are imported in such small quantities and at such irregular intervals that they cut a small figure indeed. Eight species of imported fibres would include all of the really important kinds representing the material of the great textile industries. They are cotton, flax, hemp, jute, manila hemp, sisal hemp, Tampico and coir or coconut fibre. The fibres of lesser importance are China grass or ramie, raffia, Mauritius hemp, Sunn hemp, New Zealand flax, a few of the Mexican Agaves and Yuccas, Piassaba or Brazilian bass, broom root, Esparto, Crin végétal, rattan and vegetable sponge. Straw plait (and its manufactures) are also imported in considerable quantities, and there is some bamboo, kittool and palmyra.

Of native fibres, commercially employed, we use in manufacture slough grass, Spanish moss, two species of Florida palmetto and the woods of several species of forest trees in basketry and wood pulp, besides straw and maize husks. Many native fibres are used by the North American Indian tribes, but as these are in no way commercial they are not included here. While the fibres of lesser importance are briefly referred to in this article, the references to the more important textile forms will be found alphabetically arranged under their common names, as cotton, flax, hemp, etc. Among spinning fibres of lesser importance are ramie, or China grass, Mauritius and Sunn hemps and New Zealand flax.

Sunn hemp, *Crotalaria juncea,* is a leguminous shrub which abounds in India and Australia. Synonyms: Conkanee hemp, Indian hemp, Kenna and Madras hemp. A bast fibre which takes the place of jute in portions of India, though it is lighter in color and a better fibre, with a tensile strength which adapts it for cordage; used for rope making in this country. In India is used for cordage, nets, sackcloth, twine and paper, 50,000 acres having been cultivated in northern provinces in a single year.

Mauritius hemp, *Furcræa gigantea*, is imported from Africa, as its name implies; thrives in the West Indies and Central and South America. Introduced into India, Ceylon and Australia. The plant is closely allied to the Agaves (such as the sisal hemp plant), the fibre being derived from the leaves, which are four to seven feet long and four to six inches wide. A structural fibre, it is very similar to sisal hemp though not quite as strong, and is used for the same purposes. The commercial supply is derived only from Saint Helena and Mauritius, where the plant is cultivated. In Venezuela the native supply of this fibre is made into bags, halters, horse blankets, fish nets and cordage, and is known as *fique*.

New Zealand Flax, *Phormium tenax*. A structural fibre derived from the leaves of a liliaceous plant, resembling the flag, native to New Zealand, but found in other portions of Australia. Distributed to the Azores, Saint Helena, Algiers, southern France and the British Isles. Thrives in California, where its leaves are used as tie material. Its many varieties produced in New Zealand yield fibre capable of manufacture into cloth of the texture of linen, satchels, table mats, sandals, sacks, rugs and mattings, threads and twines of superior strength, cordage and cables. An inferior grade has been imported into the United States for the manufacture of binding twine. The staff used in the construction of exposition buildings is stiffened with a low grade of this fibre. At the present time 9,000 tons of the fibre is being imported annually, worth about $255 per ton.

Broom Root, *Epicampes macroura*. Also known as Mexican whisk and *Raiz de Zacaton*. A fibre of a bright yellow color, wavy as though crimped, stiff and harsh, measuring from 10 to 15 inches in length. Is a substitute for Venetian whisk and is used in this country for clothing and velvet brushes, scrub and other household brushes, brooms, etc. The fibre is simply the cleaned roots of a grass which abounds in a wild state in southern Mexico. The roots of *Chrysopogon gryllus* are also solid under the name "broom root," and are superior to the Epicampes product.

Piassava. Two species are represented in the commercial product known as "true piassava," the Para fibre, *Leopoldina piassaba*, also known as monkey bass, and *Attalea funifera*, both derived from Brazilian palms. An African species, *Raphia vinifera*, known as West African bass, has been imported to a slight extent in late years. The Bass fibres, from these three species, are stiff and wiry, bright chocolate in color, and are used for very stiff household brushes and brooms, and for street-sweeping machines. The fibre is obtained from the dilated bases of the leaf stalks, which separate into a long coarse fringe; this is collected by the natives, sorted and tied in bundles, and baled for market.

Palmyra, *Borassus flabellifer* also sold as "piassava," is a similar palm fibre from Ceylon, a little finer, redder in color, and about two feet long. It is obtained from the base of the petioles or leafstalks. It is also found in India and tropical West Africa; used as a brush material; first came into notice in 1891. Trade name, Cassine.

Kittool, a similar fibre, derived from the jaggery palm, *Caryota urens*. Structural fibre; brownish black, the filaments straight, smooth and glossy, showing considerable tenacity, and capable of twisting as the fibre is elastic. Common in India and Ceylon. We have imported as high as $16,000 worth of kittool in a single year for the manufacture of brushes for brewers' use. The fibre is taken from the bases of the leafstalks. For further information concerning this and other fibres briefly mentioned consult 'A Descriptive Catalogue of Useful Fibre Plants of the World,' and 'Dictionary of the Economic Products of India.'

Palmetto fibre. Two species of the Florida palmetto supply commercial brush fibre. The fibre from the saw palmetto, *Serrenoa serrulata*, is derived from the macerated stems of the leaves, which are sometimes five feet long. It is a harsh, brittle fibre, white in color when well prepared, and makes a very cheap substitute for bristle brushes. Also used as a substitute for cow's hair in plaster, while the shredded leaves have been employed as mattress filling. The cabbage palmetto, *Sabal palmetto*, yields fibre reddish in color, somewhat resembling cocoa fibre. It is derived from the "boots" or spathes of the leaf-stems which surround the bud or "cabbage," and in securing the bud the tree is killed. After a process of steaming and crushing the boots, the mass is combed and the softer, tangled fibre extracted, leaving the stiff, straight, coarse brush material, which represents about 25 per cent of the original fibrous substance of a boot. This product goes into cheap brushes for household use.

Crin végétal, or African fibre, *Chamærops humilis*, is derived from an Algerian species of palm similar to the Florida palmetto. The commercial product is produced by shredding the leaves, and as imported resembles twisted ropes of hay. It comes in two colors, a pale greenish (called white) and in black. The twisting crinkles the fibre so that when again opened it retains the "curl," and in this form is employed as a substitute for curled hair in the filling of mattresses. As the fibre is quite elastic it is a valuable upholstery material.

Spanish moss, *Tillandsia usenoides*. This is a native filling fibre. The plant is parasitic on trees and is seen hanging in dense gray masses in many portions of tropical and subtropical America. The fibre is the entire plant in mass, after the gray epidermis has been removed. It is black in color, and resembles curled horse hair, for which it is a tolerable substitute. Manufactured chiefly in Charleston, S. C., and in New Orleans, La.

Pulu, a Hawaiian surface fibre, useful for stuffing pillows, etc., is simply the hairs which grow at the bases of the leafstalks of several species of *Cibotium*, a genus of tree ferns. It is regularly exported from Honolulu to San Francisco. The substance is yellowish in color and resembles wool. The golden moss of the Chinese is a similar fibre.

Raffia, *Raphia ruffia*, is a palm fibre, imported from Madagascar. The commercial product comes in the form of narrow ribbons of fibrous material, derived from the cuticle of the leaves of an African palm, taken before they are fully expanded, by peeling the leaf on both sides. Imported as a tie material for

FIBRE PLANTS

1 Sisal Hemp
3 Cocoanut Plant

2 Istle or Tampico Hemp
4 Mauritius Hemp

FIBRE PLANTS

1 California Hemp
4 China Grass, or Ramie

2 Sunn Hemp
5 Cabbage Palmetto

3 Louisiana Jute
6 Sponge Cucumber

nurserymen; used also for the manufacture and trimming of ladies' hats; has recently come into extensive use in connection with splints of rattan, for hand-made fancy baskets, the art now being taught in all of our larger cities. Takes dye readily, and can be purchased in several colors.

Another millinery trimming fibre is the Cuba bast, *Hibiscus elatus,* which comes in the form of thin ribbons of bast, which are the separated layers of the inner bark of a large tree. These ribbons or strips are plaited into ladies' hats, either in the flat, or twisted forms, the white color and satiny sheen making the product peculiarly adaptable to the purpose. In this connection may be mentioned the poplar and willow shavings, or thin strips of wood known as "chip," and imported from Germany for the same purposes.

Straw is imported from Italy, Germany and Japan, wrought into "straw plait" or "braids" for the manufacture of hats, fancy baskets, etc. The Tuscan braids are the finest and are produced from wheat straw specially grown, although rye straw is also employed in Italy. The braids from China and Japan are from rice and barley straw, while the Bohemian straw plait is from wheat. Two native American grasses, *Poa pratensis* and *Sporobolus indicus,* have also, in past time, been employed for the same purpose.

The Eastern or Oriental floor mattings imported into this country are made from several species of rushes or sedges. The Chinese and Korean are produced from *Cyperus tegetiformis;* the Japanese from *Cyperus unitans* and *Juncus effusus;* the Indian from *C. corymbosus, C. esculentus* and *C. tegetum.* Other species are also employed, though the above are the most common. The Japanese mat rush industry is very extensive, over $400,000 worth of mats having been exported in a single year. *Cyperus unitans* is the *Shichito-i* of Japan, from which the cheaper, coarser mats, for the common people, are produced, while *Juncus effusus* is the *Bingo-i,* or form employed for the mats of the higher classes, both being cultivated. The technique of mat making is practically the same in China, Japan, India and Ceylon. The culms are either used entire or split into two or more parts, and woven upon a warp of thread, these often stretched upon the floor, for much of this material is woven by laborious hand methods.

In the United States a new form of floor matting has recently come into vogue, produced from slough grass, *Carex filiformis,* also known as the slender sedge. The material grows wild over vast areas of the river bottoms of the Mississippi, and streams tributary. It is cut in July or August, dried, and by means of special machinery worked into a continuous strand, bound with thread or fine twine. It is afterward woven into mattings, the warp being cotton yarns in high colors. The grass twine as prepared for weaving is also used as binder twine for grain.

The sponge cucumber or snake gourd, *Luffa cylindrica,* is imported from Japan in considerable quantities as a substitute for the bath sponge. The commercial article is the entire gourd with the epidermis and seeds removed, presenting the appearance of a network of straw-colored fibre. It is extensively cultivated in Japan, for export. Grows in the southern United States, but has never been produced commercially, though used for bath sponge, flesh brush, dish cloths, and even for fancy baskets and bonnet crowns.

Among high-grade fibres that have been the subject of experiment in the United States but which are not produced commercially may be mentioned pineapple fibre, from *Ananasa sativa.* Fibre extracted in Florida was found to be fine, soft, flexible and very resistant. The filaments yield to treatment in the alkaline bath and are easily subdivided, producing an admirable spinning fibre. In the Philippines, the fibre is used to some extent in the fabric known as piña cloth, which is becoming known in Europe and America, and may become of commercial importance. Consult Special Report No. 5, Office of Fibre Investigations, Department of Agriculture, Washington, and Bulletin No. 4, Philippine Bureau of Agriculture, Manila, for further information regarding pineapple fibre.

Another valuable but unemployed spinning fibre that might be produced in the United States is the bowstring hemp, various species of *Sansevieria.* The plant grows to perfection in southern Florida, and yields a fibre which combines all the good qualities of length, strength, fineness, color and divisibility, which adapts it for employment in the manufacture of fine threads, and even fabrics. There are eight or more species of bowstring hemps, all of which are considered valuable for fibre. The Florida species is *S. longiflora.*

Mexico abounds in fibre plants, many species of Agave and Yucca not recognized as standard commercial forms being employed for rope, coarse bags and mattings. A little of this fibre finds its way to the United States for employment in coarse twine manufacture, though not in appreciable quantities at present. Palma Istle and Pita Sylvestre are local trade names applied to a harsh, low-grade fibre produced from two species of Yucca. Pita is a Mexican name applied to several Agave fibres, and to some allied species, though pita is generally understood to mean the fibre of *Agave americana.* There are several species of Agave, known in Mexico as Mescals, which produce fibre of good strength, which might be employed in cheaper grades of cordage.

Since the annexation of the Philippines, research has been made throughout the islands with the special object of discovering valuable fibre plants. A large number has been found, tested and classified. The groups of plants which have yielded commercial fibres include the ferns, pandans, grasses, bamboos, sedges and rushes, palms, agaves, pineapples, cottons (including Kapok) and basts of several shrubs and trees.

Both climbing and non-climbing ferns are used, the fibres being made into hats, ropes and baskets. The pandan fibres are of both fine and coarse grades, and are wrought into hats, sleeping mats, baskets, wall-pockets, picture frames and slippers.

The fibres of grasses make hats, slippers, ropes and brooms. Of the bamboo fibres are made hats, baskets and furniture. Sedges are used entire for mattings and the fluff of the cat-tail spikes forms a stuffing for upholstery. From certain of the palm leaves are obtained the fibrous strips which are made into Buntal, Calasiao and Bangkok hats. Pineapple cloths are woven of the fibre of the leaves from the finest gauze to a coarse net. There are three varieties of jute growing wild over immense areas and dozens of trees and shrubby plants yielding basts.

The processes of preparing the fibres for commerce are of two general types: in one fermentation is first resorted to in order to disintegrate binding substances, as with jute and ramie. This is followed by beating and scraping and hackling. With the fibres of fleshy plants like the agaves, sisal and New Zealand hemp, the leaves or stalks are simply run through a crushing machine and the soft pulp then removed by scraping. Washing and drying complete the preparation.

The imports of raw commercial fibres for the year ending 31 Dec. 1917 were valued at over $95,000,000, though this sum should not be taken as alone representing the consumption of fibre manufactures in the United States, for we import vast quantities in the manufactured form. As an illustration, the importation of flax manufactures in a single year has been seven times greater than the imports of raw and hacked flax for the same period. The principal items with their values imported in the calendar year 1917 were as follows: flax, 7,331 tons, $5,276,777; hemp, 9,745 tons, $2,829,-518; istle, 29,156 tons, $2,539,146; jute, 87,682 tons, $8,315,121; kapoc, 7,565 tons, $1,855,673; manila, 92,112 tons, $27,321,018; New Zealand flax, 9,019 tons, $2,286,922; sisal, 143,871 tons, $43,053,717. In addition to this raw material, there were imported 486,161,880 pounds of burlaps and plain woven jute fabrics, valued at $53,472,680, and 34,473,234 pounds of jute bags, valued at $2,850,323. Binding twine and coir yarn, gunny cloth for cotton bales, etc., totaled a value of over $14,000,000. The increases in importation have been phenomenal since the war began, the 1917 figures being nearly double those of 1914). (See Coir; Cordage; Cordage Industries; Cotton; Flax; Hemp; Istle; Jute; Manila Hemp; Matting; Ramie; Sisal Hemp). Consult Carter, H. A., 'Ramie' (London 1910); Dodge, C. R., 'A Descriptive Catalogue of Useful Fibre Plants of the World' (United States Agriculture Dept., 1897); Goulding, E., 'Cotton and Other Vegetable Fibres' (London 1917); Hannan, W. I., 'The Textile Fibres of Commerce' (London 1902); Mitchell, C. A., and Prideaux, R. M., 'Fibres Used in Textile and Allied Industries' (London 1910); Muller, T., 'Industrial Fibre Plants of the Philippines' (Manila 1913); Posselt, E. A., 'Fibre Structure' (Philadelphia 1892).

FIBRE. See Chemistry, Progress of.

FIBRE PLANTS. See Esparto; Fibre; Flax; Jute; Ramie; Sisal, etc.

FIBRIN, fī'brin, the chief substance formed in the coagulation of the blood-plasma. It may also be found in coagulation of lymph and in other fluids that contain fibrinogen. It is usually taken from the blood by whipping it with a bunch of wire or glass rods as it falls into a vessel, before it has had time to coagulate into a solid mass. When obtained from fresh blood in this way, fibrin is a stringy substance while wet, and dries to a glue-like mass. It is a proteid, and consists of at least two globulins, one coagulating at 50° C., the other at 56° C. Under the action of pepsin these are converted into acid albumin, proteoses and peptones. Blood yields from .2 to 4 per cent of its weight of dry fibrin. Fibrin decomposes peroxide of hydrogen without itself suffering any chemical change. See Blood; Fibrinogen; Globulins.

FIBRINOGEN, fī'bri-nō-jen, a substance found in the plasma of the blood, and which brings about spontaneous coagulation of that fluid. It is also found in the lymph and in a number of other fluids of the body. Fibrinogen may be precipitated from the blood-plasma by the addition of magnesium sulphate or sodium chloride. It is soluble in dilute alkalis, and is precipitated from solutions in these weak alkalis by acetic acid. Fibrinogen is probably not a simple substance, but a mixture existing in loose combination of at least three substances. These as given by Schäfer are fibrinogen proper, coagulating at 56° C., a globulin, described by Hammarsten, and termed fibrinoglobulin, and a nucleoproteid. The relationships of fibrinogen and fibrin and the blood-ferment are expressed by Schäfer as follows: "(1) That the coagulation of blood, that is, the transformation of fibrinogen into fibrin, requires for its consummation the interaction of a nucleoproteid (prothrombin) and soluble lime salts, and the consequent production of a ferment (thrombin); (2) that either nucleoproteid is not present in appreciable amount in the plasma of circulating blood, or that the interaction in question is prevented from occurring within the blood vessels by some means at present not understood; (3) that the nucleoproteid (prothrombin) appears, and the interaction occurs, as soon as the blood is drawn and is allowed to come into contact with a foreign surface, the source of the nuceloproteid being in all probability mainly the leucocytes (and blood-platelets?); (4) that, under certain circumstances and conditions, either the nucleoproteid does not appear in the plasma of drawn blood, or it appears, but the interaction between it and the lime salts is prevented or delayed; (5) that the nucleoproteid (prothrombin) appears in the plasma of circulating blood under certain conditions, being in all probability shed from the red blood-corpuscles; and that when shed out under these conditions from the corpuscles, or when artificially injected into the vessels, it tends to interact with the lime-salts of the plasma and to form fibrin ferment (thrombin), intravascular coagulation being the result; (6) that, under other conditions, either the shedding out of nucleoproteid from the corpuscles, or its interaction with the lime-salts of the plasma, may be altogether prevented and the blood rendered incoagulable, unless nucleoproteid be artificially added, or unless a modification of the conditions is introduced which will permit of the interaction of the nucleoproteid with lime to form ferment; (7) that nucleoproteid (prothrombin) is incompetent, in the entire absence of lime-salts to promote the transformation of fibrinogen into fibrin; but, as a result of its interaction with lime-salts, it becomes transformed into a ferment (thrombin), which, under suitable conditions of temperature and the like, produces fibrin; (8) that either the place of nucleoproteid in coagulation may be taken by certain albumoses, such as those found in snake-venom, and by certain artificial colloidal substances, such as those prepared by Grimaux, or that such substances may act by setting free nucleoproteid from the leucocytes and other elements in the blood or from the cells of the blood vessels, and thus indirectly promote coagulation.» See Blood; Coagulation; Fibrin; Globulins.

FIBRO CARTILAGE. See Cartilage.

FIBROLITE. See Sillimanite.

FIBROMA. See Tumor.

FIBROPSAMMOMA. See Tumor.

FIBROSARCOMA. See Tumor.

FIBULA. See Anatomy; Osteology.

FIBULA PRÆNESTINA, fĭ-bū'lạ prĭ'nĕs-ti'nạ, a gold brooch found at Præneste in 1886. It bears an inscription in Old Italic lettering, which is the oldest extant specimen of Latin. The inscription reads: Manios med Fhefhaked Numasioi, which in later Latin would be written: Manius me fecit Numasio. The brooch dates probably from the 6th century B.C. Consult Egbert, 'Latin Inscriptions' (New York 1896).

FICHEL, fē-shel, **Eugène,** French painter: b. Paris, 30 Aug. 1826; d. there, 2 Feb. 1895. He entered the École des Beaux-Arts in 1844 and became a pupil of Delaroche, but painted very much more under the inspiration of Meissonier, whose exquisite handling is suggested in numerous small canvases of his which by their refined technique and vivid action recall the characteristic intensity and directness of composition which belong to the painter of 'Friedland.' The principal works of Fichel are of a high order of genre, and include, 'The End of Dinner'; 'A Festival in the Year 1776'; 'The Capture of a Spy'; 'The Wandering Singers,' etc., and the following historic pictures, which have the freedom and imagination of pure genre: 'The Night of August 24, 1572'; 'Founding of the French Academy.' He was a chevalier of the Legion of Honor and, in 1857, received a medal for his painting in the Salon of that year. In the latter he exhibited a canvas every year, up to a few years before his death. Many of his pictures are in galleries all over the world. Two of his paintings, 'A Violin Player,' executed in 1871, and 'Awaiting an Audience,' painted in 1881, are in the New York Metropolitan Museum of Art. Consult Montrosier, E., 'Les Artistes Modernes' (Vol. IV, Paris 1884).

FICHTE, fĭH'tĕ, **Immanuel Hermann von,** German philosopher: b. Jena, 18 July 1796; d. Stuttgart, 8 Aug. 1879. He was a son of Johann Gottlieb Fichte (q.v.). He was graduated at the University of Berlin in 1818. Soon after he became a lecturer in philosophy at this institution. As a result of semi-official suggestions, based on official disapproval of his supposedly liberal views, he decided, in 1822, to leave Berlin, and accepted a professorship at the gymnasium in Saarbrücken. In 1826 he went in the same capacity to Düsseldorf. In 1836 he was appointed extraordinary, and in 1840 ordinary professor of philosophy at the University of Bonn, where he quickly became a successful and much admired lecturer. Dissatisfied with the reactionary tendencies of the Prussian Ministry of Education, he accepted a call to the chair of philosophy at the University of Tübingen in 1842 where he continued to give lectures on all philosophic subjects until his retirement in 1862 when he moved to Stuttgart. As a philosopher he was of lesser importance than his father. In his philosophy he was a theist and strongly opposed to the Hegelian School. The additional characteristics of mysticism and eclecticism, which are frequently attributed to him, are only partially deserved. His greatest gift, perhaps, was his breadth of vision, enabling him to do justice to and give a philosophic interpretation of practically every new development and discovery throughout the long period of his intellectual activity (1818–1879). He was a very prolific writer. Many of his shorter works appeared in the *Zeitschrift für Philosophie und Speculative Theologie,* which Fichte founded in 1837 and which he edited from then on, later with Ulrici and Wirth, when the name was changed to *Zeitschrift für Philosophie und Philosophische Kritik* after a short period of suspension (1848–52). Of his many published works the following may be especially mentioned: 'Sätze zur Vorschule der Theologie' (Stuttgart 1826); 'Beiträge zur Charakteristik der Neueren Philosophie' (Sulzbach 1829); 'Über Gegensatz, Wendepunkt und Ziel Heutiger Philosophie' (3 parts, Heidelberg 1832–36); 'Grundzüge zum Systeme der Philosophie' (3 parts, Heidelberg 1833–46); 'Religion und Philosophie in ihrem Gegenwärtigen Verhältniss' (Heidelberg 1834); 'Die Idee der Persönlichkeit und der Individuellen Fortdauer' (Elberfeld 1834); 'Die Spekulative Theologie' (3 parts, Heidelberg 1846–47); 'Grundsätze für die Philosophie der Zukunft' (Stuttgart 1847); 'System der Ethik' (2 vols., Heidelberg 1850–53); 'Anthropologie' (Heidelberg 1856); 'Zur Seelenfrage, etc.' (Leipzig 1859); 'Psychologie' (2 vols., Heidelberg 1864–73); 'Vermischte Schriften' (2 vols., Heidelberg 1869); 'Die Theistische Weltansicht und ihre Berechtigung' (Heidelberg 1873); 'Der neuere Spiritualismus' (Heidelberg 1878). He also edited his father's writings under the title 'Leben und Briefwechsel' (2 vols., Sulzbach 1830); 'Nachgelassene Werke' (3 vols., Bonn 1834–35); 'J. G. Fichte's Sämtliche Werke' (8 vols., Berlin 1845–46); 'Der Materialismus unserer Zeit in Deutschland, etc.' (Leipzig 1866); a translation from the French work by P. Janet published originally in Paris in 1864, likewise bore his name as editor. Some of his works have been translated into English by J. D. Morell as 'Contributions to Mental Philosophy' (London 1860). Consult Erdmann, J. E., 'History of Philosophy' (3 vols., London 1890); Eucken, R., 'Zur Erinnerung, I. H. Fichte' (in *Zeitschrift für Philosophie,* Vol. CX, Bonn-Leipzig 1897); Hartmann, K., 'I. H. Fichte' (in *Allgemeine Deutsche Biographie,* Vol. XLVIII, Leipzig 1904); Scherer, C. C., 'Die Gotteslehre von I. H. Fichte' (1902).

FICHTE, Johann Gottlieb, German philosopher: b. at Rammenau in Lusatia, 19 May 1762; d. Berlin, 27 Jan. 1814. He came of healthy peasant stock which had lived in the region for many generations. A tradition in the family was to the effect that a Swedish sergeant, left wounded in the village during the wars of Gustavus Adolphus, had recovered and later married the daughter of his kindly benefactor. From this marriage sprang the

Fichtes, a family noted in the neighborhood for its probity and piety. Christian Fichte, Johann Gottlieb's father, married somewhat above his station. It has been suggested that a certain impatience which Fichte himself displayed throughout his life was an inheritance from his mother.

Young Fichte received the rudiments of his education from his father. He early showed remarkable ability, and it was owing to his reputation among the villagers that he gained the opportunity for a better education than he otherwise would have received. The story runs that Freiherr von Militz, a country landowner, arrived too late to hear the local pastor preach. He was, however, informed that a lad in the neighborhood would be able to repeat the sermon practically *verbatim*. The upshot of the affair was that the lad was taken under Von Militz's protection. He was placed in the family of Pastor Krebel at Niederau near Meissen and there received thorough grounding in the classics. The kindly home of the good pastor must have made the parting from his parents less severe than it would otherwise have been. From this time onward, Fichte saw little of his parents. In October of the year 1774, we find him at the celebrated foundation-school at Pforta near Naumberg. This famous school is associated with the names of Novalis, the Schlegels, Fichte and Nietzsche. The spirit of the institution was semi-monastic and, while the education given was excellent in its way, it is doubtful whether there was enough social life and contact with the world for a pupil of Fichte's temperament and antecedents. Perhaps his education strengthened a tendency toward introspection and independence, characteristics which appear strongly in his doctrines and writings. In 1780, he enrolled himself in the theological faculty at Jena. How far his heart was given to the career for which this was an opening it is impossible to say. His mother desired it, and it was the path of least resistance for a poor boy of pietistic heritage. It is well to bear in mind that Schelling and Hegel, two other leaders of German romantic idealism, entered philosophy from theology, a fact not without bearing upon the drift of their thinking. Fichte seems to have supported himself at this period of bitter poverty and hard struggle, years which surely had their effect upon his spirit. He now became a tutor and spent two of the happiest years of his life at Zürich in Switzerland. Here he met Johanna Rahn who was afterward to be his wife.

Thus far, Fichte had not discovered his vocation. He had already become acquainted with the philosophy of Spinoza and shown a tendency to adapt its monism to the problems of theology. This influence of Spinoza remained with him throughout his life and affected his interpretation of Kant. It was not until about 1790, however, that he studied the Kantian philosophy. In it, he at last found what he had been seeking, a satisfactory way of approach to speculative problems; a way of approach, moreover, which did justice to those moral demands which were such a dominant part of his nature. He now occupied himself with the task of thinking through the implications of the Kantian position and of perfecting it. But while he was assimilating the Kantian philosophy and preparing to develop it, fate gave him another blow. Financial reverses were suffered by the Rahn family, and the impending marriage had to be postponed. He went as a tutor to Warsaw, but was soon released. Now came his chance to see Kant at Königsberg. After a disappointing first interview, he shut himself in his lodgings and threw all his energies into the composition of an essay which would compel Kant's attention and interest. This essay, completed in five weeks, was the 'Versuch einer Kritik aller Offenbarung' ('Essay toward a Critique of all Revelation'). Kant's interest was awakened and led to the publication of the essay. Fichte's name having been omitted from the title-page by accident, it was taken by reviewers for Kant's own production. Fichte's reputation was thus made as the best interpreter of the critical philosophy. In October 1793, he was married at Zürich, where he remained the rest of the year. Stirred by the events and principles of the French Revolution, he wrote and published anonymously two pamphlets which mark him as a devoted defender of liberty of thought and action and an advocate of political changes. In December of the same year, he received an invitation to fill the position of extraordinary professor of philosophy at Jena. He accepted and began his lectures in May of the next year. His success was immediate. He seems to have excelled as a lecturer because of the earnestness and force of his personality. These lectures were later published under the title 'The Vocation of the Scholar.' He gave himself up to intense production, and a succession of works soon appeared. Among these are his chief work, 'Foundation of the whole Theory of Science' (1789); 'Theory of Morals' (1798), and several 'Introductions' to his system. It is generally admitted that his theoretical philosophy reflects his practical philosophy. The primacy of the moral will is his starting-point. After weathering a couple of academic storms, he was finally dismissed as a result of a charge of atheism (1799). The whole affair was unfortunate, to say the least. For Fichte, God should be conceived primarily in moral terms. To many this seemed to rob Him of personality. Since all the German states except Prussia had joined in the cry against him, he was forced to go to Berlin. Here he associated himself with the Schlegels, Schleiermacher, Schelling and Tieck. The disaster at Jena in which Napoleon completely crushed the Prussian army drove him abroad for a time, but he returned the next year (1807) and continued his literary activity. The deplorable situation of Germany stirred him to the depths and led him to deliver the famous 'Addresses to the German Nation' (1808) which guided the uprising against Napoleon. He became a professor of the new university at Berlin founded in 1809, and its rector in the succeeding year. But, once more, his impetuosity and reforming zeal led to friction, and he resigned in 1812. The campaign against Napoleon began, and the hospitals at Berlin were soon full of patients. Fichte's wife devoted herself to nursing and caught a virulent fever. Just as she was recovering, he, himself, was stricken down. He did not have the force to recover and died 27 Jan. 1814.

JOHANN GOTTLIEB FICHTE

Fichte's philosophy was a speculative development of certain aspects of Kant's doctrines. It can best be understood when considered an audacious attempt to simplify the ‘Critique of Pure Reason’ in the light of the ‘Critique of Practical Reason.’ Fichte's genius was ethical, as we have already pointed out, and he instinctively took the active ego of the second Critique as his point of departure. For a proper appreciation of the importance of this remodeling and speculative interpretation of Kantianism, a brief analysis of the structure of the latter philosophy is necessary. Kant began his constructive thinking in an attempt to meet Hume's atomistic sensationalism. His problem was to determine how an assumed manifold of sense could be organized into the world of law and order with which science is acquainted. Only, Kant argued by the agency of a synthetic ego working through a priori forms such as space, time, substance, causality, etc., which are contributed by the mind. These forms were painstakingly enumerated and grouped together by him, but he was unable to deduce them from the ego or relate them to it in a satisfactory way. Moreover, he granted the existence of things-in-themselves, outside of experience and unknown, yet productive of the manifold of sense which the mind had to weave into an ordered phenomenal realm. Fichte believed that Kant had not been critical enough of his assumptions and had consequently failed to produce the harmonious system which a deeper insight could yield. His double clue was to reject the thing-in-itself and so to interpret the active ego as to make it the source of the structure of experience. The result of this double reform was the speculative type of ethical idealism which appears in the ‘Wissenschaftslehre.’

The fundamental principle of his theory of knowledge is, that there can be nothing in the ego which is not a product of the activity of the ego. Kant had accepted a manifold of sense foreign to the ego. Fichte rejects this as pure dogmatism. If the ego alone is active, it is impossible to account for the origin of our ideas by means of a non-ego, for this would be passive and incapable of originating anything. The careful reader who is acquainted with the history of philosophy will realize that we have here the same motive which led Berkeley to reject matter and Leibnitz to substitute monads for Descartes' extended substance. Having chosen idealism, Fichte proceeds to deduce the general character of experience from the laws of the ego's activity. The ego is the veritable essence of our nature and, in moments of carefully prepared intuition its free, spiritual energy can be glimpsed welling up within us. Such an intuition requires effort and a character distinguished by self-reliance. The reader should again note a parallel. M. Henri Bergson's philosophy stresses just such a prepared effort of intuition. The first act of the ego is to posit itself. But there is much in experience besides the ego, much which we are not aware of producing. Hence, another principle is necessary. The ego posits a non-ego. But analysis of consciousness shows that the empirical ego is a limited ego in relation with a limited non-ego. We are thus led to a third principle: The ego posits a limited ego in opposition to a limited non-ego. These three principles are fundamental for Fichte and constitute together an example of his antithetical method.

In order to bring out the speculative, or aprioristic, tone of his thinking, it may be well to give an example of that deduction of the forms of the mind which he put in the place of Kant's scholastic enumeration. The form of time arises when the different acts of the ego occur in such a manner as to be dependent on each other in a definite order. As Höffding points out, Fichte did not have a rich enough psychology at his disposal and he was tempted into arbitrary applications of his principles and method.

Two questions of extreme significance for the interpretation of Fichte's philosophy remain: What is the relation of the limited empirical ego to the infinite ego? Why does the ego posit a non-ego? In answer to the first question it is best to admit that Fichte assumes an infinite ego which works within us and which is more than we are. Had he a right to call this something an ego? It seems that, in his later years, mysticism more and more triumphed and he drifted toward Spinoza, the inspirer of his earliest thinking. The answer to the second question brings the ethical bias of his system into relief. The ego limits itself by the non-ego in order that it may have a field of opposition against which it may struggle and so develop itself. We may connect with this idea the ethical law which he formulates somewhat as follows: Every particular action must form a part of a series which leads me to complete spiritual freedom.

Fichte's ethics may be characterized as a vitalizing of the rather formal teaching of Kant. Duty is grounded upon the capacity for self-reliant freedom which man possesses; it is never rightly that which is urged upon the individual by authority and so from the outside. True freedom is an achievement which creates or realizes itself. Fichte succeeds in giving this outlook a social setting which looks to the coöperation of personalities as the goal. In this connection, it is of interest to note that his book ‘Der geschlossene Handelsstaat’ (The Exclusive Industrial State’) is one of the first in which what is now called state socialism was advocated. No international trade is to be permitted in order that the internal growth of each nation may take a natural course. The aim of the state should be to assign to every individual the means to culture and genuine freedom.

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FICHTELGEBIRGE, fiн'tel-gĕ-bĕr'gĕ, a mountain range, chiefly situated in the northeast of Bavaria, once covered with pines (*Fichte,* «pine»), and constituting a watershed between the head-feeders of the Elbe, the Rhine and the Danube. The elevation of the peaks ranges from 2,700 to 3,400 feet. The highest summits are Schneeberg (3,461 feet) and Ochsenkopf (3,334). In their northern extremities the Fichtelgebirge are connected by intermediate chains, on the one hand with the Erzgebirge, and on the other with the Thuringian Forest. They are composed principally of granite and primitive crystalline slates, with bands and intrusions of gneiss, micaceous slates, basalt and some strata of the Tertiary Age (*Oligocän*). The climate is moist and disagreeable in the elevated sections; snow lies on the summits from October to May. The former rich ore deposits are now exhausted; quarrying, timbering and glass manufacture are the chief industries. Of recent years the Fichtelgebirge have come much into vogue with tourists. Consult Ruchdeschel, 'Handbook of Bavaria.'

FICINO, fē-chē'nō, **Marsilio,** Italian philosopher of the Platonic school: b. Florence, 19 Oct. 1433; d. Careggi, 1 Oct. 1499. His father was physician to Cosimo de' Medici and the son's early display of talent attracted the notice of Cosimo, who made it possible for him to translate the writings of Plato and of the Neo-Platonists into Latin; he afterward taught Platonic philosophy at the Academy established by Cosimo about 1440. Ficino engaged in this work the more readily, because he viewed the Platonic philosophy as a sort of preliminary to, and confirmation of, the Christian faith. In his accounts of this philosophy he did not always make an accurate distinction between Plato and the New Platonists, as appears from his 'Theologia Platonica; de Immortalitate Animorum ac æterna Felicitate' (Florence 1482), in which he particularly defends the immortality of the soul against the Aristotelians of his age. Mystic and fanciful views are interwoven with this defense; astrological doctrines, for example, which he afterward rejected. In 1476 he took orders and was presented by Lorenzo de' Medici with the rectorship of two Florentine churches, and a canonry in the cathedral. His Latin works were first published complete as 'Opera, etc.' (2 vols., Basel 1576). He also wrote 'De Christiana Religione' (Florence 1474); 'De Triplica Vita' (Florence 1489); 'De Sole et lumine' (Florence 1493). His chief claim to fame, however, rests on his translations into Latin of the works of Plato and his followers: 'Platonis opera' (Florence 1483–84; Paris 1846); 'Plotini operum philosophicorum omnium libri LIV' (Florence 1492; Oxford 1835; Paris 1855). Consult Conti, A., 'Di M. Ficino e dell' Accademia Platonica, etc.' (in *Archivio Storico Italiano,* 3d ser., Florence 1865); Corsius, J., 'M. Ficini Vita' (Pisa 1771); Ferri, L., 'Il Platonismo di Ficino' (in *La Filosofia delle Scuole Italiane,* Vol. XXIX, Florence 1884); Galeotti, L., 'Saggio Intorno alla Vite ed agli Scritti di M. Ficino' (in *Archivio Storico Italiano,* n.s., Florence 1859); Puccinotti, F., 'Della Filosofia di M. Ficino' (in *Nuova Antologia,* Vol. V, Florence 1867); Roscoe, W., 'Life of Lorenzo de' Medici' (2 vols., Liverpool 1795; new edition, London 1883); Sieveking, K., 'Geschichte der Platonischen Akademie zu Florenz' (Göttingen 1812); Symonds, J. A., 'Renaissance in Italy: The Revival of Learning' (London 1877); Weitenweber, W. R., 'Über des M. Ficinus Werke' (Prague 1855).

FICK, fik, **Adolf,** German physiologist: b. Cassel, 3 Sept. 1829; d. Blankenberghe, 21 Aug. 1901. He studied at the universities of Berlin and Marburg, receiving from the latter the degree of M.D. in 1851. In 1852 he became a lecturer in anatomy and physiology at the University of Zürich, in 1856 extraordinary professor, and in 1862 ordinary professor of physiology at that institution. In 1868 he accepted a similar position at the University of Würzburg which he occupied with great success until his retirement in 1899. He was deeply interested in all natural sciences and a strong advocate of teaching them in elementary and high schools. He was also a professed total abstainer and an active prohibitionist. The results of his extensive and careful researches in many branches of science, especially concerning the mechanics of the body and the dynamics of circulation, were published in numerous papers, a complete list of which may be found in Royal Society of London, 'Catalogue of Scientific Papers' (Vols. II, VII, IX, XII, XIV, Cambridge 1868–1915). He also published 'Die Medizinische Physik' (Braunschweig 1857); 'Kompendium der Physiologie des Menschen' (Vienna 1860); 'Lehrbuch der Anatomie und Physiologie der Sinnesorgane' (Lahr 1862); 'Untersuchungen über Elektrische Nervenreizung' (Braunschweig 1864); 'Die Naturkräfte in ihrer Wechselbeziehung' (Würzburg 1869); 'Ursache und Wirkung' (Cassel 1882); 'Gesammelte Schriften' (4 vols., Würzburg 1903). Consult Anon., 'Adolf Fick' (in *Nature,* Vol. LXVI, p. 180, London 1902); Voit, C., 'Adolf Fick' (in Königl. Bayer. Akademie der Wissenschaften, *Sitzungsberichte der Math.-Phys. Classe,* Vol. XXXII, p. 277, Munich 1902).

FICK, August, German philologist: b. Petershagen, Westphalia, 5 May 1833. He studied at Göttingen 1852–57, becoming professor of comparative philology there 1876, and occupying the same chair at Breslau 1888. He is an authority on the primitive Indo-Germanic languages and Greek philology. Among his works are 'Die ehemalige Spracheinheit der Indogermanen Europas' (1873); 'Vergleichendes Wörterbuch der Indogermanischen Sprachen,' his masterpiece (1874–76); 'Die griechischen Personennamen' (1877); and 'Die homerische Ilias nach ihrer Entstehung betrachtet und der ursprünglichen Sprachform wiederhergestellt' (1885); 'Gesammelte Schriften' (4 vols., 1903–06); 'Vorgriechische Ortsnamen' (1905); 'Hattiden und Danubier in Griechenland; weitere Forschungen zu den Vorgriechischen Ortsnamen' (1909); 'Die Entstehung der Odyssee und die Versabzahlung in den griechischen Epen' (1910). His pupils and friends issued a volume entitled 'Tépas' in honor of his 70th birthday.

FICORONI (fē'kō-rō'nē') **CIST, The,** a celebrated ancient jewel case, found at Præneste in 1738, and so named from Ficoroni, the antiquarian, who presented it to a museum at

Rome. It is about 13 inches in diameter and 18 inches high. It has representations of the Argonautic legend incised on its surface and of the finest workmanship. The names of the artist and the owner are also upon it. It dates probably from the 2d century B.C.

FICTION, *in law*, is an assumption made for the purposes of justice, though the same fact could not be proved, and may be literally untrue. There are many fictions in the civil law, and a fiction in law is said by civilians to be the assumption of an untruth for a truth, in a thing possible to have been done, but which was not done. The declaring that a note or bond made in a foreign country was made in the county where a suit is commenced upon it is an instance of a very common fiction, adopted on the ground that suits can be brought in the county only on causes of action existing within its limits; and so the practice has been introduced of declaring that the contract on which an action is brought was made in the county, though the fact seems to be entirely immaterial; for transitory actions follow the person, and it is only of such that the fiction is admitted. The fictitious characters of John Doe and Richard Roe for the purposes of various actions are well known. It is a rule that a fiction of law shall work no wrong; and the fictions in use generally come within this rule.

FICTION IN AMERICA. While the art of fiction writing in America is scarcely more than 100 years old, its genesis may be traced far back into the records of literature. Prior to 1798, when Charles Brockden Brown laid the foundations of his fame with the writings and the publication of 'Wieland,' the art of writing fiction in this country was scarcely known. Novels were published, imported and read, but they were largely the work of English writers or translations from foreign languages. With the advent of Charles Brockden Brown, however, imaginative literature began to gain a foothold, and the literary man to secure a standing in the professional world. Brown has usually been styled the precursor of the American novelist and the founder of American fiction. There had been isolated attempts at fiction writing before his day, but the results were meagre both in quantity and in quality. The list is virtually complete with 'The Pretty Story,' by Francis Hopkinson; 'The Power of Sympathy,' by Mrs. Morton; 'The Foresters,' by Jeremy Belknap; 'Modern Chivalry,' by Hugh Henry Brackenridge; 'The Algerine Captive,' by Royall Tyler (who also holds position as one of the early American dramatists); 'History of a Corporation of Servants,' a satirical romance, by John Witherspoon; 'Female Quixotism: the Romantic Opinions and Extravagant Adventures of Dorcasina Sheldon,' by Mrs. Tabitha Tenny; and 'The Coquette,' by Mrs. Hannah Foster. Of these early novels 'The Foresters,' by Jeremy Belknap, was the most important. The poet Bryant describes it as "a work which sought to embellish our literature with the charms of wit and humor." Susannah Rowson's 'Charlotte Temple' can scarcely be accounted an American novel, for it was first published in England and its author was of English birth and residence, although she lived for a considerable length of time in this country.

It is a somewhat curious fact that Charles Brockden Brown (q.v.) reveals in his work little of the American character, the American temperament and the American people. On the other hand, he shows in his own trend of thought and choice of subjects that longing for the mysterious in life which was later to find its fullest expression in Poe and in Hawthorne. He was a student of the mystic and his novels presage the beginning of modern psychical research. His 'Wieland,' 'Ormond,' 'Arthur Mervyn,' 'Edgar Huntley,' 'Clara Howard' and 'Jane Talbot' were varied expositions of experiences now classed exclusively as psychical phenomena, although by him they were treated merely from the curious and spiritual points of view. His life ended 22 Feb. 1810, before he had reached the age of 40, and so slow was the growing interest in American fiction that little advancement had been made prior to his death. With the advent of Washington Irving (q.v.) and James Fenimore Cooper (q.v.), the imaginative literature of America proved the force and might of its English heritage. As early as 1809 appeared Irving's 'Knickerbocker History of New York,' which may fairly be classed as a romance if not as a novel. It was Irving's second published work, his first being the volume of reprinted miscellany called 'Salmagundi,' which had appeared the year before. Surrounded by a group of brilliant men, Irving settled down to a life of literary leisure, and in time 'The Sketch Book,' 'Bracebridge Hall' and 'Tales of a Traveler' took their place in literature. James Kirke Paulding (q.v.), his friend and comrade, shared the honors of the 'Salmagundi' essays with Irving, and in 1813 his 'Diverting History of John Bull and Brother Jonathan' led the way to a continuous flow of volumes in fiction, poetry and essay which did not cease until his death, 6 April 1860. 'The Dutchman's Fireside' was his most important novel.

It was not, however, until 1821–22 that the novel of American life, written by a typical American author, began its vogue. In that year, with the publication of 'The Spy,' the fame of James Fenimore Cooper had its beginning. He had already written 'Precaution' (1820); but that novel was a romance of English society life and does not form a part of Cooper's most characteristic work. After 'The Spy' came 'The Pioneers'; 'The Pilot'; 'Lionel Lincoln'; 'The Last of the Mohicans'; 'The Bravo'; 'The Prairie'; and 'The Red Rover'; and for 30 years, until his death, 14 Sept. 1851, Cooper was the pre-eminent American novelist who was equally expert in chronicling the life of the Indians and in writing the narratives of perilous adventures by sea. During this period the American novel and the American novelist proved their position secure. John Pendleton Kennedy, with his 'Swallow Barn'; 'Rob of the Bowl'; and 'Horseshoe Robinson'; Dr. Robert Montgomery Bird, with his 'Nick of the Woods'; William Ware with his 'Zenobia' and 'Julian'; Herman Melville with his 'Typee'; 'Omoo'; and other remarkable sea stories; William Gilmore Simms, next to Cooper the most voluminous American novelist, with his many revolutionary and border romances; Charles Fenno Hoffman with his many romances of historical and legendary lore; Mrs.

Caroline M. Sedgwick with her ‹Redwood›; ‹Hope Leslie›; and ‹The Linwoods› are among the few names of novel writers who flourished during the period following the advent of James Fenimore Cooper. One name alone — the greatest of them all — that of Edgar Allen Poe, has been omitted. Poe's (q.v.) work covered so many branches of literature and the man himself is so assuredly one of the world's great writers that he needs no more than passing mention in this review of American fiction. As a master of the short story and as a writer of some of the finest tales known to any language — ‹The Murders in the Rue Morgue›; ‹The Tell Tale Heart›; ‹The Fall of the House of Usher› — Poe's rank is secure. His achievements in other fields are fully outlined in the article in this work devoted especially to him.

Fittingly after Poe comes the name of Nathaniel Hawthorne (q.v.), for it was in 1850, the year following Poe's death, that ‹The Scarlet Letter› was published. This was the first if not the only great American novel. There had been nothing like it in American literature, and scarcely anything like it in the world's literature. At the time of its publication, Hawthorne was 45 years of age; he had been writing since boyhood and his name had been known for 15 years as that of a novelist and short-story writer of peculiar style, extraordinary gifts and sombre tendencies. ‹The Scarlet Letter,› however, immediately showed the unique and unapproachable power of his genius, and with ‹The House of the Seven Gables› (1851), ‹The Blithedale Romance› (1852) and ‹The Marble Faun› (1860), which followed, it placed Hawthorne among the greatest of the world's fiction-writers. During this era of Hawthorne's progress the art of writing fiction was growing apace. In 1852, ‹Uncle Tom's Cabin› achieved three things: it made Mrs. Harriet Beecher Stowe (q.v.) a famous woman, it aroused an enormous public sentiment against slavery and it created a desire for novel reading among hundreds of thousands of people who could not before have been persuaded even to look into a work of fiction. Mrs. Stowe, as was to be expected, never repeated the triumphant success of ‹Uncle Tom's Cabin,› although during her long life she wrote many novels. Nathaniel P. Willis, at this time at the height of his fame, was turning out volume after volume of fantastic work in poetry, fiction and essays. George William Curtis' long and versatile career covered both the ante-bellum and the post-bellum periods; his ‹Prue and I,› his ‹Potiphar Papers,› and his ‹Trumps› being simply imaginative wanderings into a form of fiction and social satire somewhat apart from his general literary interests. Susan Warner had, in the year of the publication of ‹The Scarlet Letter,› gained for herself an extraordinary popularity with ‹The Wide, Wide World,› a story still in extensive demand at public libraries, and Mrs. Mary Jane Holmes, Mrs. E. D. E. N. Southworth and Mrs. Ann Sophia Stephens were beginning that long series of sensational novels which, while not a part of literature, deserve record because of the place they hold in the hearts of the reading public and because they have helped to create a reading habit which has led to better things. At this time, too, there appeared the first American historical novelist, Jeremiah Clemens, of Alabama, who wrote and published ‹The Rivals› (1859), and other novels. To this period also belongs Rev. J. H. Ingraham, who from writing many lurid, sensational novels turned in his later days to sacred history and evolved ‹The Prince of the House of David.› In the sixties, Theodore Winthrop, a descendant of an historic family, a brave young soldier and a gifted writer, began a career in letters which was untimely cut short by his death in the Civil War. He was only 33 years of age, but his ‹Cecil Dreeme,› his ‹John Brent,› and his other stories published after his death gave evidence of the power he might have become in American literature.

As early as 1839, the poet Longfellow (q.v.), returned from a European trip which had filled his receptive brain with Old World fancies and mediæval legends, wrote his ‹Hyperion,› a romantic tale, the heroine of which was Miss Frances Appleton, of Boston, whom he married in 1843. Ten years later Longfellow again turned his thoughts to prose romance, producing in ‹Kavanagh› a story remarkable more for its psychological elements than for any of those active phases of thought which should characterize a notable work of fiction. His success was so slight, however, and he was so keenly criticized for his venturesomeness in attempting to leap the bounds of his own field of poetry into an untraveled highway, that thereafter he was content to express his romantic feelings wholly in verse. Among the other American poets whose versatility led them to the writing of novels, Oliver Wendell Holmes (q.v.) is the best known. His famous ‹Breakfast Table› series is a compound of romance, essay and poesy, and its four volumes of genial miscellany and philosophy will doubtless live long after his two novels — ‹Elsie Venner› (1861), and ‹The Guardian Angel› (1867) — are forgotten. It was also in the same decade that Bayard Taylor (q.v.) added his first work of fiction to his rapid lengthening list of works in almost every branch of literature. His novels comprise ‹Hannah Thurston,› ‹John Godfrey's Fortunes,› ‹The Story of Kennett,› and ‹Joseph and His Friend,› all published between 1863 and 1870. Contemporary with Bayard Taylor was J. G. Holland, who wrote ‹Seven Oaks,› and John Townsend Trowbridge, whose ‹Neighbor Jackwood,› ‹Cudjo's Cave› and ‹Coupon Bonds› are prominent in a series of works largely made up of poetry and juvenile fiction. Trowbridge stands at the head of a long line of writers who have devoted their energies to the production of books for the young, his position among writers for boys being paralleled by Louisa May Alcott with her ‹Little Women,› ‹Little Men,› and other clever stories for girls. Other voluminous authors of juvenile fiction during the generation following 1860, when the creation of a special form of literature for boys and girls was at its height, were William T. Adams (Oliver Optic), Horatio Alger, Jr., Elijah Kellogg and Harry Castlemon. They all of them obviously tried to instruct as well as to amuse their youthful readers, a double purpose attained with less success by that pioneer of juvenile authors, Jacob

Abbott, whose chief claim upon posterity he owes to the famous ‘Rollo’ books which have been burlesqued and parodied ever since their career began about the year 1840.

The modern epoch of American fiction begins with the close of the Civil War, and henceforth romance writers and novelists multiplied rapidly. The post-Civil War writers, those whose reputations were established prior to 1880 and after 1865, are meagre in numbers compared with those who became popular during the last 20 years of the 19th century. Of the writers who arose in the latter period, four names naturally come to mind — William Dean Howells, Thomas Bailey Aldrich, Bret Harte and Henry James the younger. Their names are here given in the chronological order of their appearance before the public. Mr. Howells, who through his facility as a writer and his ability to adapt himself to many varied forms of composition — the novel, the essay, the poem and the play — has practically become the most distinguished, if not the greatest American man of letters, began his apprenticeship in the exacting field of journalism with a strong tendency toward the romantic school. After the publication of ‘A Chance Acquaintance’ (1874), he turned his attention to the making of realistic novels, and it was not long before he was accepted as the exponent of a distinctive school of American fiction whose claim is its dictum that the commonplace and generally ignored facts of life shall form the true province of the novelist. His books written in pursuance of this method followed one another in rapid succession, the most notable of them being ‘A Foregone Conclusion,’ ‘A Modern Instance,’ ‘The Rise of Silas Lapham,’ ‘The Minister's Charge,’ ‘April Hopes’ and ‘A Hazard of New Fortunes.’ Although Mr. Howells has been extraordinarily active in all phases of literary work, it is distinctly as a “realistic” novelist that he is now known and will be remembered by posterity. As Mr. Howells is the exploiter of a theory in fiction, so Bret Harte was the discoverer and creator for literary purposes of an undiscovered country, the California of 1849. He was preeminently a short story writer, and it needs only a knowledge of ‘The Luck of Roaring Camp,’ ‘Tennessee's Pardner,’ of ‘M'liss’ and a hundred more of his tales to realize how thoroughly his art was restricted and how its very perfection made it impossible for him to succeed with ‘Gabriel Conroy,’ and the other long novels he attempted. Thomas Bailey Aldrich, singularly enough, became a novel writer through the vogue of a juvenile tale, ‘The Story of a Bad Boy,’ published in 1869, after serial appearance in a monthly magazine. Mr. Aldrich also published ‘Prudence Palfrey,’ ‘The Stillwater Tragedy,’ and many volumes of short stories. Although Henry James, Jr., resided in England for many years, he still held his position as an American author of unique style and genius. He made no bid for popularity, being content to express his own individuality and thought, and to expound his philosophic views of literature and life to a public which is able to understand and appreciate such novels as ‘The American,’ ‘Daisy Miller,’ ‘The Bostonians’ and ‘The Tragic Muse.’ Although Edward Everett Hale and Thomas Wentworth Higginson antedate the foregoing writers by almost a score of years, they practically belong to the same literary epoch, for it is since the Civil War that they have contributed liberally to the supply of American fiction, mainly in the form of short stories. For 20 years or more E. P. Roe's name was held high in the esteem of a large class of fiction readers who delighted in the placid commonplaces of ‘The Opening of a Chestnut Burr,’ and its companion tales, but his repute was ephemeral and he is now almost forgotten. With the mention of Frank R. Stockton, who wrote ‘The Lady or the Tiger,’ Edward Eggleston, George W. Cable, Elizabeth Stuart Phelps, Joel Chandler Harris, Francis Marion Crawford, Albion W. Tourgee, Lew Wallace (whose ‘Ben Hur’ became immediately popular upon its publication in 1881), Hamlin Garland, Harold Frederic and Sarah Orne Jewett, the story of American fiction is brought down to a time when the beginnings of present-day reputations may be remembered by the reader of to-day. Of Mark Twain and his work much could be said, for his later years were productive of famous novels: ‘The Prince and the Pauper,’ ‘Jeanne D'Arc,’ ‘Pud'nhead Wilson,’ ‘Tom Sawyer,’ and his other classics of American humor rank him among the great literary figures of the present era.

With the exception of Howells, Wallace, Mark Twain and one or two others, the first 80 years of our fiction is concerned wholly with writers native to the eastern and the southern portions of the United States. But toward the close of the 19th century the western country began to develop writers of fiction such as Owen Fister. About the same time Mary E. Wilkins arose in the East, and James Lane Allen in the South, and each has gained no little reputation for the skilful manner in which he has set down the mingled characteristics of his own locality. Miss Wilkins has brought the short story into high estate through her picturesque handling of commonplace incidents and through her delineations of New England character, while Mr. Allen has been especially adept in his analysis of the human soul. Hopkinson Smith also sounds a distinctively American note. The numerous novels written by Julian Hawthorne show the influence of heredity, and it is altogether likely that the son of Nathaniel Hawthorne might have made a higher position for himself in his chosen profession had he not been obliged to remain in the shadow of his father's great reputation. Frances Hodgson Burnett, although of English birth, may be ranked, through her long residence in this country, as an American author. ‘That Lass o' Lowrie's,’ ‘A Lady of Quality’ and the juvenile ‘Little Lord Fauntleroy,’ are evidence that she is not lacking at least in exceptional versatility. In ‘The Prophet of the Great Smoky Mountains,’ ‘In the Clouds’ and other volumes of lengthy novels and short stories, Mary N. Murfree (Charles Egbert Craddock) has made herself the historian of the Tennessee mountain region. In 1888 Margaret Deland's ‘John Ward, Preacher,’ attracted wide attention to a writer, the excellence of whose work has ever since been kept at high standard. Robert Grant, with his ‘Confessions of a Frivolous Girl’ and ‘Unleavened Bread,’ may be called the novelist of the social East and Henry Harland, although his long residence in England has caused him to lose something of his American identity is well known by such fantastic stories as 'The Cardinal's Snuff Box' and 'The Lady Paramount.' Paul Leicester Ford, historian and bibliographer, wrote 'The Honorable Peter Stirling,' an artistic novel of political life notable from every point of view and 'Janice Meredith,' a popular flamboyant novel. As a writer of animal tales Ernest Thompson Seaton has become popular and Bliss Carman, as a poet of the poets, has won a high place for himself.

The modern extravagant vogue of the historical novel has been stimulated and fostered, especially by Mary Johnson and Winston Churchill. In the late nineties Booth Tarkington achieved a veritable *tour de force* with a remarkable little story called 'Monsieur Beaucaire.' The story of American fiction may fittingly be brought to a close with the name of Edith Wharton, whose genius as expressed in 'The Touchstone,' 'The Greater Inclination' and 'The Valley of Decision,' gives her unquestioned place among modern novelists. See AMERICAN LITERATURE.

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EDWIN FRANCIS EDGETT,
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FICUS, plant genus of the Moraceæ, which includes about 600 species, mostly all of which are tropical. The common rubber plant (*F. elastica*) is of this genus.

FICUS RUMINALIS, the fig tree under which Romulus and Remus were sheltered after being abandoned. Many legends surround it. Consult Platner, 'The Topography and Monuments of Ancient Rome' (2d ed., New York 1911).

FIDDLE. See VIOLIN.

FIDDLE-BEETLE. See FUNGUS-EATERS.

FIDDLE-FISH. See MONK-FISH.

FIDDLER-CRAB, one of the small and active crabs of the genus *Gelasimus*, termed «calling crabs» by the English, who say they are waving the enormously developed front claw of the male on the right side in beckoning, while Americans imagine them to be fiddling. This great claw is brightly colored, and is thought to be used by the males not only as a weapon, but to be displayed as an attraction before the females, whose claws (chelipeds) are feeble and alike in their small size. These crabs throng in thousands in salt-marshes near high-water mark, where they dig burrows, some of which have a sort of hood over their entrances where the crab lies in wait for prey, such as beach-fleas, on which it pounces. These crabs have a breathing apparatus so modified that it serves the purpose of both gills and lungs, and all the species spend much time in the air, and in the case of some, as those which swarm along the shores of the Philippines, make long excursions on shore.

FIDEICOMMISSUM, fī'dā-ĭ-kȯm'mis-sum, in Roman and civil law, a trust bequest, originally oral, or in writing by codicil effected by the request of the decedent to the heir by law or by testament to present to a named third person a portion of the estate bequeathed. Under the earlier practice the obligation of the trustee was merely moral, depending on his honor and good faith. Later the bequest might be made in the will itself, and when certain words, as of wish or command, were used by the testator in the bequest the obligation became binding on the trustee. A special officer, known as a *prætor fideicommissarius,* was in the early Roman days placed in charge of such trusts. Certain bequests could be legally made by the *fideicommissum* that could not be made directly by testament, as for instance to aliens, which were in derogation of the civil law. The *fideicommissum* must not be confused with the common-law trust, in which latter the interest of the *cestui que trust* and the trustee coexists, while in the *fideicommissum* the interest of the *fideicommissary* does not vest until after performance by the fiduciary. Furthermore the interest of the *fideicommissary* lapses with his death if he predeceases the fiduciary.

Fideicommissa later became a regular part of the law of succession, and through them a form of entail was evolved, which could not be accomplished by testament. Subsequently, however, it was found necessary to restrict by legislation this feature of its use, to prevent property from being tied up through an objectionable number of generations. It is believed that the English law of entail, as well as of some other countries, at least in part, is founded on this branch of Roman law.

The *fideicommissum* in a modified form still exists in modern legal systems, as Holland, Germany, France and Spain. In Germany a permanently entailed estate is called a *fideicommiss.* In Louisiana, where the civil law is in force, the *fideicommissum* has been abolished by the civil code of the State.

EDWARD F. DONOVAN.

FIDELIO, grand opera in two (originally three) acts by Ludwig von Beethoven (libretto adapted by Sonnleithner and Breuning from Bouillys' 'Leonore ou l'Amore conjugale'), first produced at Vienna 20 Nov. 1805. The story of the fortunes and misfortunes of Beethoven's only work for the stage would fill a volume. After three poorly attended performances, it was withdrawn and in a revised and condensed form again brought forward the next year. A quarrel between composer and theatre manager cut short this production. It was then shelved for eight years when, again further revised, it was tried out a third time before the Viennese public and gradually made its way through the musical world. A prominent writer wrote that it was «quite devoid of music; one cannot understand why people take the trouble to weary themselves with it.» Beethoven's infinite capacity for taking pains is evidenced by the four overtures which he composed for 'Fidelio.' A still stronger confirmation appears in the sketch book which contains the material for the opera — a volume of 346 pages with 16 staves to the page — which shows no fewer than 18 distinct beginnings for Florestan's air «In des Lebens Frühlingstagen» and 10 for one of the choruses. The plot, unlike most operatic texts of the day, dealt with one of the noblest of human emotions, conjugal devotion, which impels Leonore at the risk of her life to seek service in disguise with Rocco, the jailor of her husband, Florestan, to defeat the attempt to kill him made by Pizzaro, the governor of the prison. At the critical moment a trumpet call announces the arrival of the minister who is Florestan's friend and the rescue is completed. Undeniably the book is loose-jointed and as a whole lacking in dramatic value. The music is without essential theatrical qualities, but it is deeply felt and epical in its conception and ranks with the first masterpieces of composition. Yet it stands alone in the literature of stage music. It has had but little influence on theatrical works of succeeding generations and there is nothing else with which to compare it. As one writer has well expressed it, ‹Fidelio› is a drama conceived and executed on symphonic lines. Dramatic moments there are — notably the dungeon scene with its stirring climax of the trumpet call — but speaking generally, it is not operatic music. The text and voice are not of first importance. The orchestra is the real protagonist, with its deeply expressive, emotional qualities developed as they never had been before. Every one of the separate musical numbers is important; but, if selection must be made there are the reposeful quartet in canon form, «Mir ist so Wunderbar,» Leonore's «Abscheulicher» aria, and the spiritually moving prisoners' chorus in the first act, and the duet, so expressive of ecstatic joy, «Oh, Namenlose Freude» of Leonore and Florestan in the second and the monumental overture usually played between the two acts. This overture called «Leonore No. 3,» is a favorite of orchestras and concertgoers the world over.

Lewis M. Isaacs.

FIDELITY INSURANCE. See Insurance.

FIDENÆ, fi'dē-nī, an ancient city of Latium, and the greatest rival of early Rome. It was built by the Etruscans, and was frequently at war with Rome, being subdued finally in 426 B.C. when its inhabitants were sold into slavery. It was long important as a frontier and post station. The ancient ruins are few. Consult Tacitus, ‹Annales,› IV, 62; Ashby, T., ‹Papers of the Bristol School at Rome› (Vol. III, London 1906).

FIDES, fī'dēz, the Roman goddess of faith and honesty. Numa was the first who paid her divine honors.

FIDUCIARY, a law term signifying a relation of trust and confidence, generally by one acting as trustee, executor or administrator, or a director of a corporation.

FIEDLER, fē'dlĕr, **Max,** German orchestral leader: b. Zittau 1859. His father was a teacher of music and from him he received his early instruction in piano, studying later at Leipzig under Jadassohn and Reinecke. He was appointed teacher at the Hamburg Conservatory in 1882 and became director in 1903. He organized orchestral concerts which were very successful and in 1904 became conductor of the Hamburg Philharmonic Society. He appeared in New York in 1907 as a guest of the New York Philharmonic Society and in 1908 became conductor of the Boston Symphony Orchestra, where he remained for three years. He returned to his old post in Hamburg in 1911.

FIEF, fēf. See Fee.

FIELD, Barron, English writer: b. 23 Oct. 1786; d. 11 April 1846. He was a friend of Charles Lamb and one of a distinguished group of literary men which included Coleridge, Hazlitt, Wordsworth and Leigh Hunt. He graduated in law but turned his attention to literature and became theatrical critic to the London *Times*. He contributed to Leigh Hunt's *Reflector*, the *Quarterly Review* and other periodicals. He became advocate fiscal at Ceylon and later on, judge of the Supreme Court of New South Wales and its dependencies; and went to Sydney in 1817 where he remained seven years. On his return to England he renewed his intimacy with Lamb; but he was not long at home before he was appointed chief-justice of Gibraltar where he remained most of his life. He published an analysis of Blackstone's ‹Commentaries› in 1811 which was frequently reprinted and was numerous times included in editions of Blackstone. As a result of his residence in Australia he published, ‹First Fruits of Australian Poetry› (1819); ‹Geographical Memoirs of New South Wales› (1825), including also ‹First Fruits of Australian Poetry.› He edited for the Shakespeare Society the ‹First and Second Parts of King Edward IV Histories,› ‹The True Tragedy of Richard III,› the Latin play of ‹Richardus Tertius,› ‹The Fair Maid of the Exchange› and ‹Fortune by Land and Sea.› The best of the contributions to the *Reflector* was ‹Student of the Inner Temple,› a rich collection of anecdotes of bar and bench. Barron Field has been claimed by Australian anthologies as an Australian writer, but there is nothing Australian about him except the fact of his having lived in that country for a while and having made it a subject of some of his writings which are all essentially English in form and atmosphere.

FIELD, Charles W., Confederate general: b. Woodford County, Ky., 1818; d. Washington, D. C., April 1892. He was graduated at West Point in 1849; was commissioned brevet second lieutenant; for five years served against the Indians on the frontiers of New Mexico and Texas and on the plains; was chief of cavalry and assistant instructor of cavalry tactics at West Point, 1856–61; on 31 Jan. 1861 was commissioned captain in the 2d Cavalry; but on 30 May resigned to enter the Confederate army. By August he had become colonel of the 6th Virginia Cavalry and on 9 March 1862 became brigadier-general, being assigned to an infantry brigade in A. P. Hill's division and fighting throughout the Seven Days' battles, Cedar Run and Second Bull Run, where he was wounded. After a year's absence he reported for duty, on 12 Feb. 1864 being commissioned major-general and rendering conspicuous services at the Wilderness, Spottsylvania, Cold Harbor, Petersburg, Bermuda Hundred and other important battles. From 1875–77 he was colonel of engineers in the Egyptian army, serving as inspector-general in the Abyssinian campaign, 1875–76; from 1878–81 was doorkeeper of the House of Representatives in Washington; 1881–85 was civil engineer in the service of the United States; and from 1885–89 was superintendent of the Hot Springs reservation in Arkansas.

FIELD, Cyrus West, American merchant: b. Stockbridge, Mass., 30 Nov. 1819; d. New York, 12 July 1892. He was the son of Rev. D. D. Field (q.v.). He early attained an important position in the mercantile world, and began to interest himself in ocean telegraphy. Having obtained a charter giving him exclusive right for 50 years of landing ocean telegraphs on the coast of Newfoundland, he organized an Atlantic telegraph company for the purpose of laying telegraph cables across the ocean. Attempts to lay cables were made in 1857 and 1858, but without permanent success, though ships had been provided by the English and the American governments. The scheme was interrupted by the outbreak of the American Civil War, but a renewed attempt to lay a cable was made in 1865, the *Great Eastern* now being engaged in the work. About 1,200 miles had been laid by that vessel when the cable parted; but at last, in 1866, a cable was successfully laid by the *Great Eastern*, and the broken one recovered and completed. Mr. Field subsequently took active part in establishing telegraphic communication with the West Indies, South America, etc., and was connected with various important enterprises.

FIELD, David Dudley, American Congregational clergyman: b. East Guilford (now Madison), Conn., 20 May 1781; d. Stockbridge, Mass., 15 April 1867. He was graduated at Yale in 1802; in 1804–18 held a pastorate at Haddam, Conn.; and in 1819–37 at Stockbridge, Mass. In 1837–51 he was again at Haddam. In addition to sermons he published ‹History of Middlesex County, Conn.›; ‹History of Berkshire County, Mass.›; ‹Life of David Brainerd.›

FIELD, David Dudley, American jurist: b. Haddam, Conn., 13 Feb. 1805; d. New York, 13 April 1894. He was a son of the preceding; was graduated at Williams College in 1825, studied law first in Albany, N. Y., and afterward in New York city. He was admitted to the New York bar in 1828; and practised till 1885, distinguishing himself especially by his labors in the direction of a reform of the judiciary system. In 1857 he was appointed by the State to prepare a political, civil and penal code, of which the last was adopted by New York, and all have been accepted by some other States. The new system was intended to wipe out the distinction between the forms of action and between legal and equitable remedies so that all rights of the parties in relation to the subject under litigation could be decided in one and the same forum and in a single action. The system is the basis of the reformed procedure established in England by the Judicature Act of 1873. In 1866, by a proposal brought before the British Social Science Congress, he procured the appointment of a committee of jurists from the principal nations to prepare the outlines of an international code, which were presented in a report to the same congress in 1873. This movement resulted in the formation of an association for the reform of the law of nations, and for the substitution of arbitration for war, of which Mr. Field was the first president. He was a stanch supporter of Lincoln during the Civil War, although a Democrat in his political convictions. He was a member of Congress for a short time in 1876 to fill a vacancy. Many of his papers on law reform are contained in his ‹Speeches, Arguments and Miscellaneous Papers› (New York 1884–90).

FIELD, Edward, American author, statistician and artist: b. Providence, R. I., 4 Oct. 1858. He has published ‹Tax Lists of the Town of Providence during the administration of Sir Edmund Andros and his Council 1686–1689› (1895); ‹Revolutionary Defenses in Rhode Island› (1896); ‹The Colonial Tavern› (1897); ‹Esek Hopkins, Commander-in-Chief of the Continental Navy During the American Revolution 1775–1778› (1898); ‹Diary of Col. Israel Angell, Commander of the Second Rhode Island Regiment 1778–1781›; ‹The Remains of General Nathanael Greene› (1903); ‹Memorial of Robert Folger Westcott› (1902); ‹Memorial of Horatio Rogers› (1904); ‹Fugitive Essays and Statistics› (1905–15); and other works. He is a member of the Connecticut Academy of Fine Arts.

FIELD, Eugene, American poet and journalist: b. Saint Louis, Mo., 2 Sept. 1850; d. Chicago, Ill., 4 Nov. 1895. After his mother's death, he was brought up by his cousin, Miss Mary French, at Amherst, Mass. He received his early education at Monson, Mass., and entered Williams College in 1868. His father's death in the following year necessitated a change of plans, and he was taken by his guardian, John Burgess, to Galesburg, Ill. A year at Knox College sufficed for the restless young Field. In 1870 he joined his brother at Missouri University, where he spent another joyous year, taking little interest in his studies but an active share in promoting all the pranks and nonsense of the school. He refused to take his education seriously; and, after three years of it, resolved to enter a profession. The theatrical world attracted him at first, but he soon discovered his limitations and began to consider journalism. Then he was informed that a division of his parental estate left him in possession of a few thousands. The light-hearted Field packed off to Europe, visiting the southern countries and letting his patrimony dwindle away. He landed penniless in America, full of the joy of his trip, and soon after married Miss Julia Comstock of Saint Joseph, Mo. With new responsibilities to be met, Field set to work at journalism and rose to be city editor of the Saint Joseph *Gazette* (1875–76). He wrote in a dashing, breezy, gossipy style, with rampant humor. His subsequent career in journalism was very successful. From 1876–80 he was editorial writer on the Saint Louis *Morning Journal* and the *Times-Journal* of the same city; managing editor of the Kansas City *Times* (1880–81); managing editor of the Denver *Tribune* (1881–83), and special writer on the Chicago *Daily News* and *Record* from the latter year until his death. His independent literary activity began in 1879, when his first volume of verse appeared under the title of ‹Christian Treasures.› In 1889 he again spent a year in Europe — a trip necessitated by his ill-health. His other works include ‹Denver Tribune Primer› (1882); ‹The Model Primer› (1882); ‹Culture's Garland› (1887); ‹Little Book of Western Verse› (1889); ‹Little Book of Profitable Tales' (1889); 'Echoes from the Sabine Farm' (1891); 'With Trumpet and Drum' (1892); 'Second Book of Verse' (1892); 'Holy Cross and Other Tales' (1893); 'Dibdin's Ghost' (1893); 'First Editions of American Authors' (1893); 'Facts, Confessions and Observations' (1894); 'Love Songs of Children' (1894); 'Love Affairs of a Bibliomaniac' (1896); 'The House' (1896); 'Second Book of Tales' (1896); 'Auto-Analysis' (1896); 'Field Flowers' (1897); and 'Lullaby Land' (1897).

It is as a poet of children that Mr. Field is best remembered. For this work his generous humor, his playfulness and naivete were aptly suited. Mr. Cowen, one of his earliest commentators, characterizes him thus: «Gayety was his element. He lived, loved, inspired and translated it, in the doing which latter, he wrote without strain or embarrassment, reams of prose satires, contes risqués and Hudibrastic verse.» Field's favorite characterization of himself was «the good knight, sans peur, et sans monnaie.» A number of his child-poems have been adapted to musical settings by Caro S. Seymour and others. The best study of his life is by his friend Slason Thompson (2 vols., New York 1901).

FIELD, George Wilton, American biologist: b. North Bridgewater, Mass., 29 Sept. 1863. He was graduated at Brown University in 1887 and studied also at Johns Hopkins, Naples and Munich. In 1891–92 he was assistant in biology at Johns Hopkins and in 1893–96 associate professor of cellular biology. From 1896 to 1901 he was biologist of the Rhode Island Agricultural Experiment Station, was instructor in economic biology at the Massachusetts Institute of Technology in 1902 and since 1904 has served as chairman of the Massachusetts Commission on Fisheries and Game. He is a member of several scientific societies and has published reports on numerous original biological investigations.

FIELD, Henry Martyn, American clergyman and scholar: b. Stockbridge, Mass., 3 April 1822; d. there, 26 Jan. 1907. He was graduated at Williams College, and was ordained to the ministry in 1842. In 1854 he became editor and proprietor of the New York *Evangelist*. He was a lifelong traveler. Among his works are 'Summer Pictures from Copenhagen to Venice' (1859); 'History of the Atlantic Telegraph' (1866); 'From the Lakes of Killarney to the Golden Horn' (1876); 'From Egypt to Japan' (1878); 'On the Desert' (1883); 'Among the Holy Hills' (1883); 'The Greek Islands and Turkey After the War' (1885); 'Our Western Archipelago'; 'The Barbary Coast'; 'Old Spain and New Spain'; 'Gibraltar'; 'Bright Skies and Dark Shadows.'

FIELD, Joseph M., American actor and dramatist: b. London 1810; d. 1856. He came to America early in life, and for several years led a precarious life, wandering throughout the country as an itinerant player and sometimes venturing on writing the pieces in which he appeared. His success as an actor and dramatist was little and in 1852 he became manager of a theatre in Saint Louis. In that city he acquired a few years later a controlling interest in the *Reveille*, of which he became editor. He was better known, however, as a contributor of sketches to the *Picayune* of New Orleans, and which he usually signed «Straws.»

FIELD, Marshall, American merchant: b. Conway, Mass., 18 Aug. 1835; d. New York city, 16 Jan. 1906. He received a common school and academic education in the intervals of labor on his father's farm. At 17 he entered a dry goods store in Pittsfield, Mass., as clerk, soon mastered the details of the business, and in 1856 removed to Chicago, where he entered the employ of Cooley, Wadsworth & Co., a pioneer mercantile house. In 1860 he was admitted to a junior partnership in the firm, which then became Cooley, Farwell & Co., and later Farwell, Field & Co. On the dissolution of this partnership the firm of Field, Palmer & Leiter was formed in 1865, and on the retirement of Palmer, two years later, the firm name became Field, Leiter & Co. In 1881 the Leiter interest was purchased by Mr. Field and the business was afterward continued under the firm name of Marshall Field & Co. Prior to the Chicago Fire of 1871 the sales amounted to $12,000,000 annually, but have since steadily increased to more than $60,000,000, the firm being now the largest dry goods house in the world. The single large building, which it occupied before the fire, has been replaced by one much larger devoted to the retail trade, the wholesale business being carried on in an immense building covering an entire block. In addition to these two vast establishments the house has offices in New York, England, France, Germany, Switzerland and Japan. Avoiding ostentation Mr. Field was a liberal and discriminating giver. In addition to the Field Columbian Museum (q.v.) given by him to Chicago, he bestowed gifts upon the University of Chicago, and to his native town of Conway he gave and endowed a public library, at a cost of $200,000 in memory of his parents.

FIELD, Stephen Dudley, American inventor: b. Stockbridge, Mass., 1846; d. 1913. He took out patents on very many inventions, of which the most noteworthy were a distance-telegraph box, an electric elevator, a stock ticker and a dynamo quadruplex telegraph. In 1879 he applied dynamos to telegraphy, the first person who successfully accomplished this and in 1909 he was first in applying the quadruplex telegraph to a submarine telegraph cable.

FIELD, Stephen Johnson, American jurist: b. Haddam, Conn., 4 Nov. 1816; d. Washington, D. C., 9 April 1899. He was the second son of the Rev. David Dudley Field (q.v.), and a brother of David Dudley Field (q.v.), jurist and law reformer, and of Cyrus W. Field (q.v.), the inventor of the Atlantic cable. When he was 13 years of age young Field journeyed to the East with his brother-in-law, who was a missionary and spent three years in Smyrna and Athens studying Greek and other languages. After returning to America he graduated at Williams College and for a time thereafter studied law in New York city. In 1848, soon after he was admitted to the bar, he went to Europe where he remained for one year. In 1849 he joined the rush of easterners to the new gold diggings in California and settled at the mining camp known as Yubaville, since called Marysville. Here he was elected first alcalde under the old Mexican law of that region, holding office until the organization of the judiciary under the Constitution of the State. In 1850 he was elected to the State legislature and was placed on the judiciary committee. He drew up several bills providing for articles in the State Code and some of his laws for miners and mining were afterward adopted by other States. In 1857 he was elected judge of the Supreme Court of California and two years later succeeded Judge Davis S. Terry (q.v.) as chief justice. The decisions of Justice Field in the next few years had much to do with the law of real property and large areas of disputed property were assigned to legal ownership through his decision. In 1863 President Lincoln appointed him an associate justice of the Supreme Court of the United States, which important position he held until 1897. Among his important decisions and opinions were those of the income tax cases, test oath cases and legal-tender cases. He became eminent as one of the most celebrated authorities on constitutional law. In 1876 he was a member of the famous Electoral Commission which decided the Presidency in favor of Rutherford B. Hayes of Ohio, as against Samuel J. Tilden of New York. His service on the bench of the Supreme Court was the longest in the history of that learned body.

FIELD, Magnetic, or **Field of Magnetic Force,** a term introduced by Faraday to designate any space possessing magnetic properties. A space may possess magnetic properties in three ways: on account of the natural magnetism of the earth; on account of magnets in its vicinity; or on account of currents of electricity passing through or around it. (See Electricity; Electro-Magnetism; Faraday; Magnetism). Consult Martens, F. F., ‹Physikalische Grundlagen der Elekteotechnic› (Vol. I, Brounschweig 1913).

FIELD ARTILLERY. See Ammunition.

FIELD OF THE CLOTH OF GOLD, a spot in the valley of Andren, between the English castle of Guisnes and the French castle of Ardres, celebrated for the meeting between Henry VIII of England and Francis I of France, attended by the flower of nobility of both nations. The meeting took place 7 June 1520 and concluded on the 24th, and had been planned by Cardinal Wolsey, to enable the two kings to come to an understanding as to an alliance against Charles V of Spain. The conferences led to no political results.

FIELD COLUMBIAN MUSEUM, a scientific institution of Chicago, Ill.; established through gifts by Marshall Field (q.v.) and other citizens and opened on 2 June 1894. It was incorporated on 16 Sept. 1893 as Columbian Museum of Chicago. In 1894 its name was changed to Field Columbian Museum and again in 1905 to Field Museum of Natural History. Many of the exhibits shown at the World's Columbian Exposition held in Chicago in 1893 were either dedicated or purchased for the museum and formed the nucleus of its collections which have since then been greatly enlarged. Originally they were housed in some of the buildings erected for the World's Fair, which, in part, have been supplanted by new and more up-to-date buildings. Marshall Field endowed it at its inception with a gift or $1,000,000 and in his will left an additional gift of $8,000,000. At present the museum consists of the following departments: anthropology, botany, geology, zoology and the N. A. Harris Foundation of Public School Extension. The latter loans, for purposes of exhibition in public schools, exhibits collected in show cases and is rapidly increasing its usefulness. The museum does, in its various departments, scientific researches, supports explorations on the part of its curators, and issues a series of publications for each department. It also possesses a general and various special libraries, totaling 71,316 volumes in 1918. Its receipts and disbursements balanced at $214,277 for 1917; during the same year it registered a total attendance of 191,197. Consult ‹An Historical and Descriptive Account of the Field Columbian Museum› (in *Field Columbian Museum Publications,* Historical Series, Vol. I, No. 1, Chicago 1894) and the annual reports of the director and of the various departments.

FIELD CRICKET, a large European cricket. (*Grylius campestris*), found in hot, sandy localities, where it burrows. See Cricket.

FIELD DOGS, a general name applied by sportsmen to such dogs as assist them in field sports, such as pointers, setters, spaniels, foxhounds, greyhounds, beagles and the like. (See Dog). Consult Graham, J. A., ‹The Sporting Dog› (New York 1904).

FIELD FORTIFICATIONS. See Fortifications.

FIELD GLASS, a portable binocular telescope which combines a maximum of magnifying power with a minimum of size and weight. It has an achromatic conclave eye-glass and a large achromatic object glass. Improved types secure a long focal length through an arrangement of prisms thus obviating the necessity of long unwieldy tubes.

FIELD GUN. See Artillery; Guns; Ordnance.

FIELD HOSPITALS. See Hospitals, Field.

FIELD KITCHEN. See Field Cooking.

FIELD-MARSHAL, the highest military dignity in Great Britain, Germany, Austria Russia and Sweden. George II introduced the title into England when, in 1736, he created the Duke of Argyll and the Earl of Orkney field-marshals but it had been long in use in the German armies, and is of German origin. In Great Britain the dignity is conferred by selection and is held by but few officers and chiefly for distinguished services or on the ground of royal descent and by courtesy to sovereigns of friendly states, the Emperors William II, of Germany, and Francis Joseph I, of Austria, having both been British field marshals. The corresponding rank in the British navy is admiral of the fleet.

FIELD MICE, or **VOLES,** any wild mouse, dwelling in fields and open places may be called a field mouse; but the name applies more strictly to the robust, short-tailed mice of the arvicoline group of the family *Muridæ,* representatives of which occur throughout the north temperate zone and are known in Great

Britain as «voles.» The same group includes the lemmings, muskrats and other vole-like mice dwelling in the woods. The common field-mice of the United States and Canada are of the genus *Microtus* and the common eastern «meadow-mouse» (*M. pennsylvanicus*) is distributed over the whole continent, showing many local varieties in color and form. It is five and one-half inches long, with a tail one and one-half inches, grayish-brown with chestnut tinges, blackish on the spine and hoary below. A near relative of the upper Mississippi valley is the prairie meadow-mouse (*M. austerus*), which is larger and more uniformly gray; and another is the southern pine-mouse (*M. pinetorum*), whose coat is rusty brown, short, dense and silky. Other species are distinguished on the Pacific coast. These mice feed mainly upon seeds and bark and often do vast damage in grain fields, where they not only eat or shake down a large percentage of the crop, but occasionally overrun the country in vast hordes suitably described as «plagues.» This has happened repeatedly in Europe, where the offending species was the very common field-vole (*M. agrestis*), whose inroads have sometimes nearly produced famine in southern Russia. In winter these pests of the farmer are likely to nibble the bark from young fruit-trees until they have been fatally girdled. These mice dwell in shallow burrows, or make nests of grass in various hiding places, being especially fond of working their way into grain sacks and storage-cellars. They pass the winter in these retreats, sustained by a store of seeds, etc., but hibernating only during the severest weather. The best way to combat them is not to kill off their natural enemies, the hawks, owls, harmless snakes and small carnivores. To the unwise destruction of these is due most of the «plagues» of mice. Consult Audubon and Bachman, ‹North American Quadrupeds› (1846); Godman, ‹Natural History› (1834); Kennicott's papers in the Annual Report of the United States Department of Agriculture for 1857; Ingersoll, ‹Wild Life of Orchard and Field› (1901); and Stone and Crane, ‹American Animals.›

FIELD OFFICER, a title given all officers between the ranks of captain and general officer. See ARMY ORGANIZATION.

FIELD PLOVER, a sportsmen's name for several different shore-birds, most commonly meaning the upland or Bartramian sandpiper (*Bartramia longicauda*), which resembles a killdeer (q.v.) in habits, but is not a true plover. It is 12 to 13 inches long, light-brownish, marked with ochraceous and blackish; throat nearly white and tail-feathers mostly marked with white. It is related to the European ruff.

FIELD SERVICE REGULATIONS, a military guidebook for the use of armies. The ‹Field Service Regulations, United States Army› is written and revised from time to time by the General Staff of the Army and approved and published «for the information and government of the Regular Army and the Organized Militia, and in time of war, the Volunteer and other forces. . . . The basic principles of the combat tactics of the different arms are set forth in the drill regulations of these arms for units as high as brigades. . . . While the fundamental principles of war are neither very numerous nor complex their application may be difficult and must not be limited by set rules. Officers and men of all ranks and grades are given a certain independence in the execution of the tasks to which they are assigned and are expected to show initiative in meeting the different situations as they arise.»

FIELD SPANIEL. See DOG.

FIELD SPARROW, a small familiar sparrow (*Spizella pusilla*) of North American fields and meadows, closely related to the garden chipping sparrow (q.v.), from which it differs in being slightly larger and much paler in colors. Its song, however, more resembles that of the song sparrow. It nests on the ground and lays white eggs speckled with reddish and purple.

FIELD WORKS. See FORTIFICATIONS.

FIELDFARE, a European thrush (*Turdus pilaris*) prevailingly grayish-brown with darker markings and lighter under parts. It breeds in Scandinavia and northern Russia, making nests in companies in trees and visits Great Britain and southern Europe in winter, where it is shot largely for market.

FIELDING, Anthony Vandyke Copley, English painter in water colors: b. about 1787; d. Worthing, Sussex, 3 March 1855. He early attracted attention by his water-color landscapes; gained also considerable reputation as a teacher and for many years before his death was president of the Society of Painters in Water Colors. His pictures are chiefly taken from English scenery, the various features of which, both in rich woodland and open plain, he has represented with great delicacy and truth.

FIELDING, Henry, English novelist: b. Sharpham Park, near Glastonbury, in the county of Somerset, 22 April 1707; d. Lisbon, Portugal, 8 Oct. 1754. His parents were Lieut. Edmund Fielding and his wife Sarah, daughter of Sir Henry Gould. It is believed that in the characters of Lieutenant Booth and Amelia, Fielding long afterward revived the figures of his young father and mother. By an old legend, put into magnificent form by Gibbon, the novelist was supposed to have descended from the Hapsburgs, but their connection with the ancient family of the Earls of Denbigh, to which the novelist certainly belonged, is now exploded. The Fieldings of Sharpham, though of moderate means, were well connected; the novelist's cousin was the famous Lady Mary Wortley Montagu. In 1710 his parents removed, on the death of Sir Henry Gould, to East Stour in Dorsetshire, where Sarah Fielding (1710–68), Henry's sister and the gifted author of ‹David Simple,› was born. To his childish adventures by the «pleasant banks of sweetly-winding Stour» Henry gives due record in ‹Tom Jones.› He was 11 years of age when the family moved again, after the death of Mrs. Fielding in 1718, and Henry was transferred to Eton. There is no record of his residence in the registers of the school, so that he was probably an oppidan. Murphy tells us that Fielding, when he left Eton, about 1726, «was said to be uncommonly versed in the Greek authors, and an early master of the

Latin classics»; Fielding himself tells us that he knew Italian and French, could write Latin and could read Greek. The early idea that he was a poorly-educated man was based on prejudice and ill-will. Pitt and Fox were among his comrades at Eton. Before he left school, he fell in love with Sarah Andrew, a young lady of Lyme Regis, and even planned her abduction, but the affair was discovered by her guardians, who prevented the romantic act, although, as the archives of the town still record, going in fear of their lives «owing to the behavior of Henry Fielding and his attendant, or man.» This Miss Andrew was said to be the original of Sophia Western.

From Eton, Fielding proceeded to study law at Leyden for two years, which he did «with a remarkable application.» He settled in London early in 1728, doubtful whether to adopt, as Austin Dobson says, the profession of hackney-writer or that of hackney-coachman; his father could no longer support him, and it was necessary for him to subsist upon his wits. He determined to turn playwright, but his earliest drama, the comedy of 'Love in Several Masques,' had no great success. It is difficult to trace the history of Fielding further during the next two years, but in 1730 he brought out another comedy, 'The Temple Beau,' and an extravaganza, 'The Author's Farce.' These were not unsuccessful, and they opened a long series of dramatic performances, by means of which it would seem that Fielding obtained a precarious livelihood for the next seven years. The very entertaining burlesque of 'Tom Thumb' (1730), especially in its extended form as 'The Tragedy of Tragedies' (1731), deserves a high position among these plays, most of which were of somewhat ephemeral importance. In 1732 Fielding produced 'The Modern Husband,' 'The Covent Garden Tragedy,' 'The Debauchees,' and 'The Mock-Doctor'; the last-mentioned comedy was highly successful, and so was 'The Miser,' of 1733, but Fielding's share in the profits of these pieces cannot have been large. He lived, no doubt, on what he could borrow, earn or beg; sometimes in a London garret, sometimes in the country-house of a wealthy acquaintance. A satirist of the period describes him at this time as a «rough play-house bard,» and «clad in coarse frieze,» while his best biographer infers that his daily life must have been more than usually characterized «by the vicissitudes of the eighteenth century prodigal.» 'The Intriguing Chambermaid' was Fielding's principal contribution to 1734, but the prolific dramatist was now beginning to find that the town had become sated with his light and spicy confections. The date on which Fielding married Miss Charlotte Cradock, a respectable lady of independent means living at Salisbury, to whom he had for some years been attached, was long unknown, but it has recently (1906) been discovered that the marriage took place, by license, in the church of Saint Mary's, Charlcombe, close to Bath, on 28 Nov. 1734. It is at this time, and on Miss Cradock's money, that he has been believed to have begun «immediately to vie in splendor with the neighboring country squires,» and to have maintained a large retinue of servants, «all clad in costly yellow liveries.» This story has been criticized, and, in some of the particulars with which Murphy adorns it, it must be inexact in detail, yet it probably gives not an unfair impression of the lavish way in which, for about a year, Fielding lived in Dorsetshire in a magnificence far beyond his means. His cousin, Lady Mary, said that Henry Fielding «would have wanted money if his hereditary lands had been as extensive as his imagination,» and in a few months he was back in London, again obliged to work for a precarious living. He returned to the drama, and in 1736 took the little French Theatre in the Haymarket, where he produced the successful burlesque of 'Pasquin,' by which he made more money than by any of his previous efforts. His career as a dramatic author, however, was checked by a Bill of 1737, in which Parliament restrained the license of the stage, and reduced the number of playhouses. The rest of the few and slight puppet-shows and farces which Fielding wrote need not be named here. His plays (they are 25 in number) although skilful and sprightly, have not the value of his novels, nor anything like their originality, and they are read to-day, if they are read at all, because they are Fielding's, and not because of their intrinsic merit.

When his company of actors was dispersed, Fielding turned to the law as a profession, and in November 1737 became a student of the Middle Temple. According to Murphy, he studied with great assiduity, but little is known of his life at this time. He eked out his legal work with the writing of «a large number of fugitive political tracts,» which were probably anonymous, and have disappeared. Late in 1739 he started a newspaper, the *Champion*, on the model of the *Tatler*, and in this journal he wrote much, until June 1740, when he was called to the Bar. He traveled the Western Circuit, and «assiduously attended the Wiltshire sessions.» He seems to have taken his duties as a barrister very seriously, but they did not prevent him from writing, and publishing in February 1742, the novel of 'Joseph Andrews.' This began as a parody of the popular 'Pamela' of Richardson, but soon passed on into an independent and highly entertaining study of contemporary manners. The fresh and breezy genius of Fielding mocked at the sentimentalities and the wire-drawn psychology of his predecessor, but he soon got beyond the point where it was enough for him to ridicule Richardson. He created two magnificent comic figures of his own, and he enriched English literature forever with Parson Adams and Mrs. Slipslop. It was thus that, at the age of 35, Fielding discovered, as it were by accident, the nature of the genius which he possessed. He did not, however, at once perceive the value of the discovery, but returned to his plays and his pamphlets. It was now that he published two early farces, 'Miss Lucy in Town' (1742), and 'The Wedding Day' (1743), as well as a much more important work, his 'Miscellanies,' in three volumes. This was a collection of Fielding's shorter writings up to that date, and included his poems, occasional and satirical, his essays, his 'Journey from this World to the Next,' some of his farces, and the remarkable ironic novel called 'Jonathan Wild.' The 'Journey' is a Lucianic allegory, full of wit and observation, but unfortunately left unfinished by the languor of the author, who evidently became weary of his design. 'Jonathan

Wild' is a work of far greater importance. It takes for its hero a notorious rogue who was hanged at Tyburn in 1725, and there is internal evidence that although not printed until 1743, it was written some years before. It is probable that it preceded 'Pamela,' and ought to take its place as the earliest of the novels of the new school of romance. It is a powerful and painful book, «a picture of complete vice, unrelieved by anything of human feeling,» and more unflinching than anything else which Fielding has left. It is a curious thing that from this date until 1749 we have a period of six years, during which Fielding was at the height of his powers, and was not without a certain measure of celebrity, yet which have left scarcely any mark at all upon his history. How was this great man engaged from his 37th to his 44th year? Strange as it sounds, we cannot tell. Austin Dobson has brought forward arguments to show that it was a time of poverty, darkened by successive bereavements, particularly that of the loss of his wife, to whom he was most tenderly attached. A remarkable preface, prefixed to the second edition of his sister's 'David Simple,' appeared in 1744; in this he denies his authorship of the work itself. He describes himself as applied to the legal profession «with so arduous and intelligent a diligence» that he has no time for the practice of literature. He wrote a little, however, for *The True Patriot* and other journals. In November 1747 Fielding married for the second time, and took a house at Twickenham; Mary Daniel, the second Mrs. Fielding, is said to have been her predecessor's «cook-wench.» Fielding had by this time secured an invaluable friend in George, afterward the first Lord Lyttelton (1709–73), who procured for him, in December 1748, the office of a justice of the peace for Westminster. Up to this date he had been a wanderer on the face of England, now at Salisbury, now at Twiston, at Hagley, at Twickenham, but in January 1749 he settled for good in London. John, Duke of Bedford, lent or rented to him a house in Bow Street, under terms which were described as a «princely instance of generosity.» But Lyttelton was the closest of all Fielding's influential friends, and there is a remarkable passage in which the novelist states that he partly owed to Lyttelton his existence during a great part of the time spent in the composition of 'Tom Jones,' a book which, without Lyttelton's help, «had never been completed.» It used to be stated that 'Tom Jones' was written at Bow Street, but this is impossible; it was evidently the work of the desultory months of poverty which preceded Fielding's appointment as a magistrate. The famous novel was published, as 'The History of Tom Jones, a Foundling,' on 28 Feb. 1749, in six volumes, at the price of 16 shillings a set. It had an instant success, so great that, three months later, Fielding had already received £700 from Millar, the publisher. That this did not much alter the random habits and easy negligence of the author seems to be proved by a picturesque although spiteful description given by Horace Walpole, in May 1749, of Fielding dining at the house in Bow Street «on some cold mutton and a bone of ham, both in one dish, and on the dirtiest cloth,» in the company of some very questionable persons. It is well to look at the other side, and to remember, with Murphy, that Fielding «kept his table open to those who had been his friends when young, and had impaired their own fortunes.» It is certain, moreover, that he was increasingly respected by those who could overlook the carelessness of his habits and his easy nonchalance of manners.

In May 1749 he was unanimously elected chairman of Quarter Sessions, and his magisterial charges were received with all the respect which their gravity and courage demanded. How seriously he took the duties of his office is seen in his 'True State of the Case of Bosavern Penlez' (1749), in which he vindicates the severity of the law against rioters. This was a time of great lawlessness among the London lower classes, and Fielding eminently distinguished himself by his vigilance against violent criminals and by his plans for reform. But his health was already failing; he had lived too hard and too fast, and on Hurd, who met him in 1751, the novelist produced the impression, at 44, of «a poor, emaciated, worn-out rake.» There was, however, no intellectual decline, and, at the close of this same year, there appeared the very vigorous and pathetic romance, 'Amelia.' This novel has had its enthusiastic admirers, but, to the charge that it is less broad and fresh than its immediate predecessor, there is no reply. As Fielding's best biographer has said, «Behind 'Tom Jones' there was the author's ebullient youth and manhood; behind 'Amelia' but a section of his graver middle-age.» There is a remarkable sense of decline in the juvenile vigor which was so irrepressible in 'Tom Jones'; the author of 'Amelia' writes philosophically, and like an elderly man. In the figure of the heroine, however, there was no evidence of declining powers; here is the most exquisite figure of a woman that Fielding ever painted. In 1752, Fielding, although so much occupied, found the energy to start the bi-weekly, *Covent Garden Journal*, which led him into acrimonious controversy with Smollett and others; and to collect the narratives of peculiar cases of the detection of murder which had come under his notice as a magistrate, in 'Examples of the Interposition of Providence.' In 1753 he was deeply interested, like all his contemporaries, in the mysterious case of Elizabeth Canning, who professed to have been kidnapped, and he published a pamphlet on the subject. But he was by this time greatly reduced by successive attacks of the gout, and in August of that year was ordered to retire to Bath. His going, however, and the proper treatment of his disease, were delayed by his great wish to break up a congeries of gangs of street robbers, who were committing murders in London so frequently as to alarm the government itself. But when, in December, he had at length completed this public duty, his was «no longer a Bath case,» and he was so much weakened by jaundice, dropsy and asthma, that he looked upon his condition as almost desperate. He struggled through the winter, and in June 1754 started, in search of relief, for Portugal. The tediousness and multiplied discomforts of the transit are described, with a great deal of heroism, in the 'Journal of a Voyage to Lisbon,' which was the latest and one of the best written of Fielding's works. He traveled with all his family, and they arrived in the Tagus in August. No further particulars have been preserved, but that Fielding died at Lisbon, on 8 Oct. 1754, and was buried in the beautiful cemetery of Os Cyprestres, opposite the Church of the Estrella.

With regard to the importance of Fielding's work in the development of English literature there is a complete unanimity of opinion among all competent critics. Indeed, there is scarcely a reputation which is less liable to be challenged than his. Without insisting on the title of "Father of the British Novel,"— which must belong, if it be given to anyone, to Defoe or to Richardson,— we cannot but admit that it was Fielding who first in Europe foresaw the full scope of the "comic epic poem in prose," and that his own efforts in that direction have, at their best, never been excelled. The symmetry of his books, particularly of that matchless work of art, ‘Tom Jones,’ has not been surpassed, and this is the more wonderful because, until his day, no one had perceived the fact that a work of prose fiction needs to be symmetrical. He relieved the excessive strain of feeling, which, in the case of Richardson, had sometimes amounted to a positively distressing tension, by introducing breaks of witty observation, ironic illustration, or entertaining episode, but he did this with a care for the balance of parts which makes the study of his technique extremely interesting. Byron called Fielding "the prose Homer of human nature," and in so doing he indicated the extraordinary range of sympathy which marks his delineation. There is nothing unnatural or extravagant about the incidents which he introduces, but they are such as might be expected inevitably to happen to such very natural characters as the novelist depicts.

It has been said that Fielding lacked the imaginative faculty. It would be more correct to say that he distrusted the fantastic and preposterous parts of invention, since, if imagination is the power to bring up before one's own mental vision, and to reproduce for others with fidelity a consistent chain of phenomena, then Fielding was fully endowed with that gift. His pictures are remarkable for their brightness, their freshness, the sharpness and illumination of their outline. His invention occupied itself, not with the unusual, but with the obvious scenes of life, which in his day were, fortunately, still unhackneyed. He wrote slowly and finished late; he did not hasten to exhaust the stores which adventure and experience had given him; he had warmed both hands before the fire of life, and he gave back to the world in his books what he received from it in his own rough-and-tumble youth. From Fielding we must not look for pathos or romantic sentiment,— although even these are not wholly missing,— but we must look for humor, breadth of sympathy, a general buoyancy, a wholesome recognition of the appetites, a philosophic consideration of the limitations of human frailty, and these we find in his wonderful novels to a degree which we may without fear of exaggeration confess to be elsewhere unparalleled. See Tom Jones; Joseph Andrews.

Bibliography.— Fielding's earliest biographer was Arthur Murphy (1727–1805) who prefixed an essay on his life and genius to the first collected edition of his ‘Works’ (1762). Murphy's inexactitudes were pointed out by Lawrence in 1855, and by Keightley in 1858, but by far the most accurate and dispassionate life of Fielding is that published by Austin Dobson in 1883. Subsequent editors and biographers have been content to borrow the main part of their information from this admirable monograph, which has been corrected by the author in successive editions, and is now not likely to be superseded as the standard authority on the life and bibliography of Henry Fielding. Admirable critical introduction will be found prefixed to the novel in the edition edited by G. E. Saintsbury (10 vols., London 1908). Consult also Cross, W., "The Legend of Henry Fielding," in *Yale Review* (New Haven, October 1918).

Edmund Gosse,
Author of ‘History of 18th Century Literature’; ‘History of Modern English Literature’; etc.

FIELDING, Sarah, English novelist: b. East Stour, Dorsetshire, 8 Nov. 1710; d. Bath, Somerset, April 1768. She was the third sister of Henry Fielding (q.v.). She was the author of the novel ‘David Simple’ (1744); ‘The Governess’ (1749); ‘The Cry, a Dramatic Fable’ (1754); Xenophon's ‘Memoirs of Socrates,’ translated from the Greek; ‘The Countess of Dellwyn’; ‘The History of Ophelia’; ‘The Lives of Cleopatra and Octavia’; etc.

FIELDING, William Stevens, Canadian statesman: b. Halifax, Nova Scotia, 24 Nov. 1848. He was educated in Halifax; for 20 years was connected with the Halifax *Morning Chronicle,* becoming managing editor, and resigned that position to enter public life. From 1882–96 he represented the city and county of Halifax in the provincial legislature, soon after his election becoming a member of the Cabinet and from 1884–96 Prime Minister. In 1896 he resigned to enter the Cabinet of Sir Wilfred Laurier as Minister of Finance, which position he held till 1911. During his period of office he made important tariff readjustments, introduced the British preference which resulted in a tariff war with Germany, negotiated a commercial treaty with France, and concluded the Taft-Fielding reciprocity agreement which was the dominant issue in the Dominion elections of 1911, and which suffered defeat at the hands of the electorate.

FIELDS, Annie (Adams), American poet and essayist, wife of James T. Fields (q.v.): b. Boston, Mass., 6 June 1834. She has long been prominent in charity organizations and has published ‘Under the Olive,’ poems (1881); ‘Biography of James T. Fields’ (1884); ‘How to Help the Poor’ (1885); ‘The Singing Shepherd’; ‘Authors and Their Friends’; ‘A Shelf of Old Books’ (1896); ‘Life and Letters of Harriet Beecher Stowe’ (1897); ‘Whittier: Notes of His Life and Friendships’; ‘Nathaniel Hawthorne’ (1899); ‘Orpheus, a Masque’ (1900); ‘Charles Dudley Warner’ (1904).

FIELDS, James Thomas, American publisher and author: b. Portsmouth, N. H., 31 Dec. 1817; d. Boston, 24 April 1881. He went to Boston in 1834, becoming junior partner of the firm of Ticknor, Reed & Fields in 1839, later known as Ticknor & Fields, and Fields & Osgood. He edited the *Atlantic Monthly*

(1862-70); and was an acceptable lecturer on literary subjects and authors. He published 'Poems' (1849); 'A Few Verses for a Few Friends' (1858); 'Yesterdays with Authors' (1872); 'Hawthorne' (1875); 'Old Acquaintance: Barry Cornwall and Some of His Friends' (1875); 'In and Out of Doors with Dickens' (1876); 'Underbrush' (1881), Essays; 'Ballads and Other Verses' (1881); and (with E. P. Whipple) edited 'The Family Library of British Poetry' (1878).

FIELDS, John, American agricultural writer and leader, was born at Davenport, Iowa, 29 July 1871. His early life was spent on a farm and, at the age of 16 he entered the Pennsylvania State College, from which he graduated in 1891, immediately after which he entered the service of the Pennsylvania Agricultural Experiment Station as assistant chemist. In 1896 he became an associate chemist of the Oklahoma Agricultural Experiment Station and, in 1899, was made chemist and director of the same institution, a position which he retained until 1906. In 1902 he took up the work of editing the *Oklahoma Farm Journal,* continuing until 1915, when that paper was merged with the *Oklahoma Farmer,* since which time he has been editor of the latter. Throughout his career in Oklahoma he has been active in all lines that have tended to advance the farming interests of the region in which he is most interested. Especially has he urged that farming methods must be adapted to local needs and conditions regardless of means and methods in common use in other parts of the world and especially has he urged the growing of the grain sorghums (i.e., kafir-corn, milo-maize, feterita, etc.), instead of Indian corn in the subhumid region along the eastern border of the Great Plains, where the drouth resistant qualities of the grain sorghums are such as to render their successful culture much more certain than that of Indian corn, and basing his arguments upon the known facts that have been demonstrated as the result of long experience and experimentation. In 1914 he was the Republican nominee for governor of Oklahoma and was defeated by a small plurality, though his party was in a hopeless minority. He is the author of a book entitled 'Sure Feed Crops.'

FIELDS, John Charles, Canadian mathematician: b. Hamilton, Ont., 14 May 1863. He received his education at the universities of Toronto, Johns Hopkins, Paris, Göttingen and Berlin. From 1889 to 1892 he was professor of mathematics at Allegheny College, from 1892 to 1900 he studied and traveled in Europe and from 1902 to 1905 he was special lecturer at the University of Toronto and since 1914 has been professor of mathematics there. He has published 'A Treatise on the Algebraic Functions' (1906); 'Abelian Integrals,' and other subjects.

FIELITZ, fē'lĭts, **Alexander von,** German composer: b. Leipzig, 28 Dec. 1860. He studied piano under Schulhoff and composition under Kretschmer of Dresden. He spent the 10 years 1887–97 in Italy to improve his shattered health and in the late 90's taught in a conservatory in Berlin. He came to America in 1905 and became teacher in Ziegfeld's Conservatory, Chicago, and conductor of the Symphony Orchestra of that city, which he organized. He returned to Berlin and to his former post there in 1908. He has composed several songs, some pieces for piano, suites for orchestra and the operas, 'Vendetta' (1891) and 'Das stille Dorf' (1900).

FIERDING (fėr'dĭng) **COURT,** a district or local court having jurisdiction over civil causes wherein the matter in dispute was not in excess of three marks. Such courts were general among all the Germanic nations in the period preceding the feudal system.

FIERI FACIAS, fī'ĕ-rī fā'shĭ-as, in law, is a judicial writ of execution issued on a judgment, by which the sheriff is ordered to levy the amount of the judgment on the goods and chattels of one party, for the benefit of another. Abbreviated to *fi. fa.* See EXECUTION.

FIESCHI, or **FIESCO,** fē-es'kē or fē-es'kō, **Giovanni Luigi de,** Count of Lavagna, Italian conspirator: b. Genoa 1523; d. there, 2 Jan. 1547. He became master of a large patrimony at the age of 18, and being surrounded with dependents and flatterers, and really possessing considerable talents and eloquence, was readily induced to aim at that power and distinction in the state which was then possessed by the family of Doria, headed by the famous Andrea Doria, doge of Genoa. He attempted to kill the doge and overthrow the government, but was unsuccessful in both endeavors, and in his efforts to seize the public galleys was accidentally drowned.

FIESCHI, Giuseppe Maria, Corsican conspirator: b. Corsica, 3 Dec. 1790; d. Paris, 16 Feb. 1836. Having conceived a hatred for the French king, Louis Philippe, he constructed an infernal machine of about 100 gun-barrels fixed in a frame, which he discharged simultaneously, by means of a train of gunpowder from a house in the Boulevard-du-Temple, during a review of the National Guard, 28 July 1835. The king escaped unhurt, but Marshal Mortier and 17 people were killed, and many more wounded. Fieschi and his accomplices, Pepin and Morey, were guillotined.

FIESOLE, Fra Giovanni Da. See FRA ANGELICO.

FIESOLE, fē-ā'sō-lĕ (ancient FÆSULÆ), Italy, city about three miles northeast of Florence. Under the name of Fæsulæ it was one of the 12 Etruscan cities, and a place of importance. It submitted, with the rest of Etruria, to the Roman power (90 B.C.), and was colonized by Sylla. In the commencement of the 11th century it was destroyed by the Florentines, and a number of its inhabitants transported to Florence. It contains many interesting Etruscan ruins, notably in the city wall, constructed of huge blocks of stone, and in the fortress, now occupied by a convent. The cathedral of San Romolo, built in the Romanesque style, was founded in the 11th century. Fiesole is famous as being the place where Fra Angelico (q.v.) lived for a number of years. Pop. of commune, 10,434.

FIÉVÉE, fyā-vā, **Joseph,** French journalist: b. Paris, 10 April 1767; d. there, 7 May 1839. His experiences during the French Revolution were not happy, largely in consequence of his work 'On the Necessity of a Religion' (1795); but the Napoleonic rule proved more favorable to him. He subsequently wrote two novels, 'Suzette's Dowry'; and 'Frederick'; besides historical works on aspects of the republic, consulate and empire.

FIFE, Alexander William George Duff, 6th Earl and 1st Duke of: b. 10 Nov. 1849; d. 29 Jan. 1912. He was descended from Macduff, Thane of Fife, immortalized in 'Macbeth.' He was educated at Eton; was member of Parliament for the counties of Moray and Navin, 1874-79; and was one of the founders of the Chartered Company of British South Africa. He married in 1889 Princess Maud (afterward Princess Royal), the eldest daughter of the Prince of Wales (afterward King Edward VII). On 13 Dec. 1911 he suffered shipwreck off the coast of Morocco, and the consequent shock and exposure is understood to have contributed to his last illness.

FIFE, a wind-instrument, known from very early times and used chiefly in military music. It resembles a small flute in its form and method of performance, seldom having any keys, and never more than one. It has six finger holes. Fifes are of several kinds. Those tuned to the key C are shortest and highest, and are much oftener used; they have a compass of two octaves. The instrument is characterized by a clear and piercing tone.

FIFENESS, fīf-nĕs', a headland on the northside of the Firth of Forth, and the easternmost point of the County of Fife. In the 9th century a wall was constructed here by the Danes, traces of which are still to be seen. North of the point lie the Carr rocks, marked by an iron beacon.

FIFER, Joseph Wilson, American soldier and public man: b. Staunton, Va., 28 Oct. 1840. When a boy he went with his parents to Illinois, and enlisted in the Union army in 1861; he was wounded at the battle of Jackson in 1863, but rejoined his regiment and served until 1864. After the war he was graduated from the Illinois Wesleyan University, studied law, and was admitted to the bar. He was corporation counsel for the city of Bloomington, Ill., in 1871, and State's attorney for McLean County 1872–80. In 1880 he was elected to the State senate and served four years; in 1888 he was elected governor of Illinois on the Republican ticket, but in 1892 was defeated for re-election by Altgeld. In 1904 he was appointed a member of the Interstate Commerce Commission.

FIFESHIRE, Scotland, an eastern maritime county, bounded on the north by the Firth of Tay, east by the North Sea, south by the Firth of Forth, and west by Perth, Kinross and Clackmannan. It includes the Isle of May, Inchcolm, Inchgarvie and the little island of Oxcar; the area is 504 square miles, with a coastline of over 100 miles. The Eden is the largest river and flows through the shire a total distance of 25 miles. The surface consists of a succession of hills and vales, the latter being exceedingly fertile and under intensive cultivation. The shire has large deposits of coal, iron and limestone, all of which are being worked. The principal manufactures are linens, oil cloth, and paper. Cupar is the chief town. Pop. 267,739. See Scotland.

FIFTEEN DECISIVE BATTLES OF THE WORLD, a noted work by Sir Edward Shepherd Creasy, first published 1852. It was very successful and has gone through many editions. It describes and discusses (in the words of Hallam) "those few battles of which a contrary event would have essentially varied the drama of the world in all its subsequent scenes." The volume treats, in order: The Battle of Marathon, 490 B.C.; Defeat of the Athenians at Syracuse, 413 B.C.; The Battle of Arbela, 331 B.C.; The Battle of the Metaurus, 207 B.C.; Victory of Arminius over the Roman Legions under Varus, 9 A.D.; The Battle of Châlons, 451; The Battle of Tours, 732; The Battle of Hastings, 1066; Joan of Arc's Victory Over the English at Orleans, 1429; The Defeat of the Spanish Armada, 1588; The Battle of Blenheim, 1704; The Battle of Pultowa, 1709; Victory of the Americans over Burgoyne at Saratoga, 1777; The Battle of Valmy, 1792; The Battle of Waterloo, 1815.

FIFTEENTH CENTURY. Walter Pater declared: "That solemn fifteenth century can hardly be studied too much, not merely for its positive results in the things of the intellect and the imagination, its concrete works of art, its special and prominent personalities with their profound æsthetic charm, but for its general spirit and character." ('The Renaissance'). The first part of the Renaissance undoubtedly contains many of the most significant achievements of history and the productive careers of many of the most interesting men who have ever lived. It is the age of Columbus, of Lorenzo de' Medici (the Magnificent), of much of Leonardo da Vinci's best work and Michelangelo's youth, of scores of great painters;— Montagna, Fra Angelico, Botticelli, Fra Bartolemmeo, Perugino, Titian, the Bellinis and the Vivarinis, Signorelli, Correggio,— and not alone in Italy but in the other countries, for there are Memling, Roger Van der Weyden, Quentin Matsys, Albrecht Dürer's youth; but almost as many sculptors,— Ghiberti, Donatello, Verocchio, Luca della Robbia, Adam Kraft, the Vischers, and the great architects, Alberti and Bruneleschi, with Bramante's early work. In all of these departments of æsthetics there are a number of other successful workers besides those named who in any other period would be leaders, though in this environment they are only secondary. More interesting monuments of painting, sculpture and architecture have been the subject of constant admiration ever since than from any other century. It was an era not only of art, and of the arts and crafts, but also of great practical discoveries; casting in bronze and porcelain sculpture and art work were both highly developed. The invention of printing has probably more revolutionized human life than any other. Leonardo da Vinci made a series of inventions from the wheelbarrow and the self-dumping derrick to locks for canals and the coffer-dam and a number of experiments with flying toys. He gathered material which practically laid the foundation of a group of sciences. The most beautiful manuscript books were made immediately before the invention of printing, and served as models for the printers, so that the century has the finest printing in the history of the art. Bookbinding reached a similar height of excellence. In a word, in every line of work in which the century was interested it achieved unsurpassed marvels.

The word Renaissance, «rebirth,» applied to the time is often misunderstood. For many, it means that there occurred a rebirth of interest in the intellectual life and in art and education after presumably a prolonged period of neglect in the Middle Ages, the «Dark Ages» as they were called. What really happened was a renaissance or a rebirth of interest in Greek literature and art, with the stimulus to mental development which intimate contact with Greek sources has always given. Sir Henry Maine's expression, «Whatever lives and moves in the intellectual world is Greek in origin,» is far from being absolutely true, but is eminently suggestive of Greek values. The 15th century, conceited by its cultivation of Greek, proceeded to despise the forefather generations that lacked similar advantages. In their interest in the revival of Greek architectural forms, erudites of the Renaissance called the pointed architecture of the Middle Ages Gothic,— as if it were worthy only of the barbarous invaders, the Goths, who had wiped out the older culture. The literature and art of the preceding time which we have learned to value highly was in similar strain spoken of as Gothic and was considered almost beneath notice. It has taken centuries to counteract the tradition thus created. Only in our day has due sympathy for the preceding ages developed. This lack of proper critical appreciation of the work of their predecessors is probably the worst fault of the Renaissance. It has led to a reaction which has reacted on the Renaissance itself. In its admiration for Greek things generally, the Renaissance took up also the Olympian religion and without accepting it, at least allowed interest in it to sap reverence for Christianity. Goethe's corresponding state of mind in the latest renaissance of Greek in Germany illustrates what happened. There was a distinct pagan spirit abroad, and while of course expressions used in the fashionable Latin letters are only conceits of antiquarian elegance, there was undoubtedly a widespread lessening of reverence for Christian forms. This is not so noticeable among the really great minds of the Renaissance, for such men as Michelangelo, Regiomontanus, à Kempis, Nicholas of Cusa, Columbus and Leonardo da Vinci were even devout. Many great Renaissance leaders were members of religious orders. A number of the lesser minds of the time were carried away completely by their admiration for the ancient and lost their firm footing of solid religious principles. This served to make the time ripe for the religious revolt which took up so much of the attention of men in the next century.

The 15th century holds the transition between the Middle Ages and modern history. The end of the Middle Ages is usually said to be the Fall of Constantinople in 1453, though occasionally it has been suggested that a better date for a boundary between the two periods would be the discovery of America in 1492. The fall of Constintinople is the most important military and political event of the century. It was led up to from the very beginning. Tamerlane, Timur the Mongol or the Lame, a successor of Jhenghis Khan, occupied the Caucasus, Armenia and Mesopotamia, after reducing Persia towards the end of the 14th century and then proceeded to add southern Russia and India to his empire. Just at the beginning of the 15th century he was forced by a rebellion in Syria to turn, and in 1401 destroyed Aleppo, burned Damascus and stormed Bagdad. He defeated Bajazet or Bajezid, the Sultan of the Turks, who died in prison in 1403, but Timur himself followed his prisoner to death in 1405. Timur's empire then fell to pieces and left the Turks free for their long contemplated capture of Constantinople. A series of attacks were made upon the city. It was clearly but a question of time before the capital of the Eastern Empire would fall. The recognition of this impending disaster aroused some of the serious thinkers of Europe to the necessity for a Crusade, but without avail. A series of Popes took up the subject and the result was at least a bringing together of the Eastern and Western Churches. A council was held at Ferrara for the union of the Latins and the Greeks, but in spite of Cardinal Bessarion's influence, and the fact of Pope Eugenius IV, the long years of religious differences between the peoples prevented the reunion from being more than short-lived. A European army was sent to aid the Greeks, and the Turks were defeated, Sophia and Nissa being conquered by Hunyadi the Magyar Christian hero (1443). Another expedition under the heroic Skanderbeg (Castriota), Prince of Albania, was defeated (1444). The Hungarians and Albanians were the only champions of Western Christianity, and their efforts proved vain against the overpowering numbers of the Turks. In the spring of 1453 Mohammed besieged Constantinople by both land and sea with 150,000 men, and 420 ships, and the place fell by storm, 23 May.

The year of the fall of Constantinople (1453) was also that of the end of the Hundred Years' War between France and England, which had served to hamper the intellectual development of both these countries to a very serious extent. Now they might have had time for other thoughts and the Renaissance been given an opportunity to exert itself to the full, but it was seriously set back in England by the unfortunate civil wars of the Roses and by internal dissensions of many kinds in France. The English who had laid claims to French territory ever since the time of William the Conqueror had been able to vindicate those claims to some extent in the later 14th century, but Henry V with a small army of English soldiers won the Battle of Agincourt, 1415, and marrying the French king's daughter, was to succeed to the title of King of France on the death of the poor mad French monarch, Charles VI. His son Charles VII found a following in France that enabled him to hold out for a time against the English under the Duke of Bedford, but he was nearly at the end of his resources in every way when Joan of Arc, a young shepherd maiden of Domremy offered to lead his army, awakened the country, relieved Orleans and had Charles crowned King of France at Rheims. Her marvelous story is one of the strangest in history. This country girl from the confines of Lorraine was at the age of 17 the general-in-chief of the armies of France. When her heavenly appointed task, as she proclaimed it, was done, she asked to be allowed to withdraw into obscurity once more, but her presence was deemed too valuable for the morale of the French army to permit this and after a time she was captured by the English. To discredit her they put her to death as a witch, but her trial only served to emphasize her virtues. Her life, the only one in all history as Mark Twain has said, every detail of which we have under oath from eye witnesses, remains the marvel of history.

The Wars of the Roses absorbed English attention for a generation and caused an immense amount of suffering and death before it could be settled whether the House of York, whose symbol was the white rose, or the House of Lancaster of the red rose should rule in England. The Lancastrians were supported mainly by the north of England, the Yorkists by the south. More important than any of the kings of the time was the Duke of Warwick, the king-maker as he came to be called, whose adhesion to one side or the other again and again turned the scale. The pathetic character of the time is Henry VI, the gentle, kindly but weak monarch who probably deserves the name of saint which some people have accorded him, though others have proclaimed him simply a fool. He will ever be recalled for his liberality in the cause of religion and learning and for his foundations at Eton and Cambridge. The villain of the Wars of the Roses is Richard III, whom historians have been vindicating in recent years and who was undoubtedly an able man and popular among the people. The stigma upon his name for the murder of the little Princes in the Tower of London has never been wiped out, and this makes it easy to understand why historians should have been ready to credit other evil traditions with regard to him.

After varying fortunes, the Yorkists winning the first battle at Saint Albans, 1455, and others in 1459 and 1460, Margaret, the undaunted wife of Henry VI, refusing to accept the compromise by which Henry was to reign for life and be succeeded by the Duke of York, moved heaven and earth for her son Edward, and won the Battle of Wakefield, where York was slain. She also won the second Battle of Saint Albans. Decisively defeated by Warwick at Towton Heath, Margaret still kept up the struggle until her son was slain at Tewkesbury (1471). When the Yorkists won Tewkesbury, York seemed assured of the throne. The death of Edward IV, however, leaving Edward and Richard, the little Princes in the care of their uncle, Richard Duke of Gloucester, who murdered them, gave the chance for Lancaster in the person of Henry VII to make a popular appeal, gather an army and defeat Richard at Bosworth. By marrying Elizabeth, the eldest daughter of Edward IV, Henry united the two houses. He proved to be a very thrifty king who imposed taxes and gathered immense sums of money, consolidating the kingdom for his son Henry VIII, who proceeded to spend royally until his treasury was exhausted.

Italy was the most significant country for the early Renaissance and the important political development there was the prominence of Florence and the rise of the Medici family. Florence at the end of the Middle Ages was a city of beautiful buildings, unsurpassed works of art, with its citizens famous for practical interest in commerce and in the development of trade, but even more interested in the arts and crafts. The most important family in Florence was the de' Medici, whose name first appeared in the chronicles of the 13th century, and may have been due to the fact that they were members of the Guild of the Apothecaries at a time when these dealt not only in drugs but in perfumes, jewels, and precious Eastern stuffs of various kinds, and thus laid the foundation of an immense fortune. Giovanni, the son of Bicci de' Medici, the founder of the family, ignored politics and devoted himself to trade and especially to international banking. The fortune thus acquired gave his descendants their immense influence in the city. Giovanni died in 1429, leaving two sons, Cosimo and Lorenzo. Cosimo's descendants exercised the most absolute sway over Florence for generations. The younger branch of the family reached distincton later, becoming Dukes of Tuscany. Cosimo, without holding any office in Florence, established a domination over the city, all the more surprising because Florence was a pure democracy whose citizens were jealous of their liberty. In spite of this, without official title, the de' Medici ruled Florence for more than a century. Historians have searched history for parallels. "It was a very different matter than with the lords or tyrants in old Greece, and it was much more than Pericles was to Athens, for the authority was passed on from father to son. It was more like the power of Augustus and the other Roman Emperors who respected the forms of the Commonwealth." (Freeman). The best parallel for an American would be that of a political "boss" holding no office yet dictating elections and maintaining power quite apart from the completely democratic form of our government. The one great difference is that the Medici exercised their power for the benefit of the city and had as much pride in maintaining Florence's prestige as any of her citizens, though of course, they carefully looked out for the family interests.

The greatest of the Medici was Lorenzo, the grandson of Cosimo, who owed his popularity to the immense prestige which his grandfather had left him as an inheritance. After Cosimo's death, the citizens of Florence conferred on him for all that he had done for the city, the title of *Pater Patriæ* (Father of his Country). Lorenzo was very much less interested in the commercial affairs of the house than his ancestors but was possessed of distinct literary talent, and had, besides, a fine taste in literature and the arts. He was a thoroughly practical politician, however, and succeeded in neutralizing the schemes of his enemies of whom there were not a few. His brother Giuliano became a victim to a conspiracy from which Lorenzo escaped but very narrowly. Lorenzo died at the age of 53 in 1492, but what he accomplished for Florence by his patronage of arts and letters during his short life eminently merited for him the title of the Magnificent, which he has received in history. His influence served to make Florence the centre of the intellectual and artistic world of the period, and the men who gathered around him achieved some of the greatest masterpieces that the world has ever known. His own part in the literature of the time, for he was a poet of merit, give him a distinction from the other Mæcenases of history. The Medici palace became an academy, Distinguished scholars like Politian, Ficino and Pico della Mirandola were in constant attendance upon Lorenzo, and the Platonic academy they organized, fostered the knowledge of Greek literature and art as well as philosophy. In addition, however, scholarship and classic erudition were not more welcomed at court than poetry in the vernacular. Pulci gave readings of his 'Morganti Maggiore,' and Lorenzo read his own poems and encouraged Italian poetry in every form. Artists found a munificent patron in him. It is said that Lorenzo himself could speak with equal fluency on painting, sculpture, music, philosophy and poetry. He was imbued with the idea of creating a true national literature for Italy and refining the Tuscan speech as his country's language. His faults are evident and particularly his thoroughgoing ways with his enemies and his readiness to meet treachery and underhand means by similar weapons. He was a beneficent autocrat in so far as his autocracy replaced the democracy of Florence.

This century saw a revolution in education and as always happens with such an event, there was a wide-spread awakening of interest in educational matters. The Latin and Greek classics became the favorite foundation in education under the name of the Humanities or the New Learning. The universities at first, with some notable exceptions, as Florence, refused to admit these studies to their curriculum. They had as the basis of their teaching the seven liberal arts, the Trivium and the Quadrivium, which were really seven important disciplines taught from a scientific standpoint. Very much the same situation developed then as in the last generation of the 19th century when university faculties, conservative as always, refused to replace the classical training of undergraduates which had finally gained ground in the Renaissance by the newly developed physical sciences. Denied admittance to the universities of the 15th century, the classics were taught in special schools of the New Learning, founded by princes and cities, and special schoolmasters were invited to take charge of these schools. The greatest of these teachers of the Humanities was Vittorino da Feltre, who was invited to Mantua to teach the Gonzagas and their friends. His course included besides Latin and Greek, philosophy, mathematics, grammar, logic, music, singing, and dancing. He emphasized however that the principal aim of education was to teach scholars «to live the simple life, to tell the truth, and to remember that true scholarship is inseparable from virtue and a sense of lofty gratitude towards the Creator.» The training of the body was not neglected. Out-door sports were insisted upon for both women and men so as to secure a healthy mind in a healthy body. Virgil. Cicero, Homer and Demosthemes were read with running comments. Greek themes, that is, exercises from the vernacular into Greek were insisted upon, and certain of the more elegant passages had to be learned by heart. Vittorino believed in solid mental development secured through hard work, not showy erudition. A contemporary declared that «for virtue, learning, and a rare and excellent way of teaching good manners, this man surpassed all others.» Vittorino was one of the great schoolmasters of all time. The details of his teaching methods are of special interest because they formed the model for other teachers.

Italy was not alone in developing schools of the New Learning in this century. The Humanities were the subject of profound attention in the Teutonic countries and such distinguished teachers as Rudolph Agricola, Reuchlin who was known as «the three-tongued wonder of Germany,» Jacob Wimpfeling to whom the title of «schoolmaster of Germany» has been given, did their works largely in this century. Erasmus was 35 years of age before the century closed and in its later years exercised a deep influence on the classical scholarship of England during his stay there. The most important classical schools outside of Italy at this time were those of the Brothers of the Common Life. The best proof of their success as teachers is to be found in the names of such pupils as Cardinal Nicholas of Cusa, Thomas à Kempis, Agricola, Alexander Hegius, Erasmus, Wimpfeling, not to mention others scarcely less prominent in the intellectual life of the time. The main purpose of their teaching was to afford instruction to the poor and often they assisted those who were unable to pay their living expenses.

Their schools multiplied rapidly, as well in numbers as in attendance, and Deventer the most famous of them counted some two thousand students about the time of the discovery of America. The period owed much to «those humble minded, patient teachers and thinkers whose devotion and fire of soul for a century and a half made the choice treasures of palaces and convents and universities a common possession along the low-lying shores of the Netherlands.» (Hamilton Mabie). The greatest literary product of the brethren is the 'Imitatio Christi,' now universally attributed to Thomas à Kempis. This has been declared «the most influential book that ever came from the hand of man, the Scriptures having come from the hand of God.» It has been popular all down the ages among all classes of people and has not lost its popularity in our time. When some years ago lists of the ten best books of the world were asked for from the most distinguished living writers, the 'Imitation' was almost invariably placed among the first five with the Bible, Shakespeare, Homer and Dante. It is a marvel of knowledge of the human mind and its motives. See article IMITATION OF CHRIST.

The most interesting feature of this revival of education in the 15th century was that women were admitted to it as well as men. Vittorino da Feltre made two conditions on his coming to teach at Mantua:— one was that poor students who showed ability should be allowed to enter his classes, and that women should also be students. Some of the young women were his favorite pupils. Cecilia Gonzaga began the study of Greek under his direction at the age of seven, could read Chrysostom at eight, and could write Greek with singular purity at the age of 12. Issotta Nogarola the favorite pupil of Guarino of Verona, the serious rival of Vittorino da Feltre as a teacher, is scarcely less famous than Cecilia Gonzaga and there are many stories which reveal how deep was feminine interest in education at this time. Sandys, in his Harvard lectures on 'The Revival of Learning,' notes that «the studious temper was often associated with habits of piety and strong religious feeling,» and names some of these learned young ladies who later entered religious orders. Most towns in Italy of any importance had their school of New Learning and with it opportunities of higher feminine education. It would seem that by the end of the century as many young women in proportion to the rather meagre population of the time were enjoying the privilege of education as in our time.

The distinguished women of the Italian Renaissance include besides the Gonzagas and the d'Estes, such names as Vittoria Colonna of the great Roman family of that name, Lucrezia Tornabuoni, the mother of Lorenzo the Magnificent, and such less well known names as Tullia d'Aragona, noted for her precociousness, Olympia Morata, Hippolita Sforza, Battista Montefeltro, both famous for addresses delivered in Latin on important occasions, Leonora Cibo and Pellegrina Lascara who translated the Æneid of Virgil and the Odes of Horace, and others who might be mentioned. These learned women of the Renaissance made erudition fashionable and study a social duty, but they are famous mainly for making their homes beautiful and devoting themselves to the beautification of their surroundings. These traits have only come to be properly appreciated since we have paid more attention in recent years to the house and garden beautiful and have realized that the home and its surroundings must reflect the owner's tastes. The models left by the Renaissance women are now an inspiration and exemplar.

Women of the century played an extremely important rôle in its political as well as its intellectual life. The most important character of the first half was Joan of Arc. The greatest personage of the second part was Isabella of Castile, the greatest of women rulers and one of the greatest of all rulers. Joan's career ended at the stake but Isabella after the expulsion of the Moors and Columbus' discoveries, lived to be the ruler of one of the largest empires the world has ever seen. Her character was equal to the occasion, hence her place in history. She and her husband were so poor on their marriage that they could not give the presents usual according to Spanish custom. She is said to have repaired one of her husband's coats no less than seven times. Beautiful specimens of her needle work are shown in many Spanish churches. Anxious to learn Latin, she shared her children's lessons. She made a magnificent collection of books, fostered the universities, was a generous patron of Cardinal Ximenes who did so much for Spanish scholarship at this time, helped him to found the University of Alcalá, invited prominent scholars to Spain and made it clear in every way that she felt education to be the most important thing for her people. Under her reign, the Inquisition was established but nothing shows so well the original intention of the institution as a means to prevent internal dissension among her people as Isabella's well known tenderness of heart. In the midst of the almost continual wars of her early reign, she found time and means to organize camp hospitals, the first it is said, in history. She was solicitous to spare captured enemies and insisted that wounded prisoners must be treated like their own wounded. The poor were always her special care and nothing so aroused her indignation and her prompt action for justice as to learn that a noble had been imposing on them. She often put herself to great personal inconvenience to maintain their rights. When Columbus offered some of the Indians he had brought home with him to some of the Spanish nobles, the Queen indignantly demanded, «Who gave permission to Columbus to parcel out my subjects to any one?» Hearing that some of the Indians were held as slaves in Spain, she ordered that they should be returned to their own country at the expense of the person who held them. She was a woman of inexhaustible energy. The mother of many children, she spent nights in the saddle when maternal duties might seem to make that impossible. She was the very life of her soldiers in their struggle with the Moors. Her reign issued in a period of greatness for Spain which lasted for many generations. She encouraged education for women so successfully that in the following century practically every university in Spain had women professors. Prescott compares her to Queen Elizabeth, but sets Isabella far above her English rival.

The national spirit that had been aroused in France under the stimulus of Joan of Arc's inspiration served to unify the country, but the consolidation of modern France in this century is mainly due to the machinations of Louis XI. Louis is one of the most despicable characters in history. He succeeded however in bringing low the power of the nobles and consolidating France during his troubled reign with its devious political ways and his many broken pledges, in the midst of internal dissensions, until he created the beginning of the modern France that we know. Louis succeeded in incorporating Burgundy and Picardy with the territory of Boulogne into the royal domain, and obtained, moreover, the cession of Artois and Franche-Comté as the dowry of the daughter of Maximilian, while he extended his rule over Armagnac and Rousillon, so that the troublous times of the preceding reigns with the nobles against the king could be no more. As Commines said on the death of the Duke of Burgundy, Charles the Bold, who for so long successfully opposed the king: «Never afterwards did the King of France find a man bold enough to raise his head against him or to contradict his will.»

The French literature of the 15th century contains some writers destined to world influence, at least among literary men, ever since. The most prominent of these is undoubtedly Francois Villon (1431–84), the vagabond poet, who has had a striking revival in our time. Another is the royal poet, Charles d'Orleans (1391–1467) whose *ballade* for his dead wife has been a favorite poem for poets at least, for some five centuries. Villon owed his life when forfeited to the state for theft to Charles, but the poetry of the ne'er-do-well far surpassed in interest for the modern time that of his royal contemporary and benefactor. A third poet was Alain Chartier (died 1449), better known however as an orator «the father of French eloquence.» French prose is very well represented by Commines (1445–1511), often spoken of as a chronicler, but really one of the first of modern historians. No one would think of trving to understand the period with regard to which he wrote without reading his work.

The Popes of the second half of the century, once the effects of the Great Schism passed, bulk large in history. Pope Nicholas V (1448–55) was a generous patron of the New Learning and founded the Vatican Library. Pope Calixtus III (1455–58), the first Borgia pope, continued this liberal policy as a man of cultivated mind and fine taste. With Spanish zeal against the Mohammedans, he stirred up the rulers of Europe against the Turks. Menzel, the German historian, says "that anything at all that was done against the Turks was wholly due to the exertions of the Pope." He encouraged the coming of Greek scholars into Italy and such men as Theodore Gaza, George of Trebizond, Chalcondyles of Athens, Argyropulos and Gemistes Pletho of Constantinople brought with them literary treasures while their teachings stimulated an enthusiasm for Greek learning. Calixtus began the unfortunate policy of Papal nepotism by creating two nephews Cardinals on the same day and the third Duke of Spoleto and Governor of the Castle of Saint Angelo, thus initiating the prominence of the Borgia family in Italian politics. His successor was Æneas Silvius Piccolomini the distinguished Renaissance scholar who took the name Pius II (1458–64). Born in poverty because of his father's exile, he was 18 before he began his studies but he became famous for the elegance of his Latinity, his poetry and — strange combination — of deep knowledge of canon and civil law. In the midst of a most successful career as a diplomat, a serious illness led him to realize the emptiness of earthly ambitions and taught him as he said himself that "the sum of all knowledge is to know how to die." He became as distinguished for his piety as for his learning and having passed through the various degrees of the hierarchy, was elected Pope. He made it the task of his life to rouse the Christian nations against the Turks but with little avail. He tried to bring about the conversion of the Mohammedan ruler to Christianity with like failure. The Christian Princes were divided by their own ambitions, the Sultan Mohammed was bent on his. The failure of his efforts hastened his death. His successor Pope Paul II (1464–71) feared the danger to religion of pagan learning unless properly regulated and endeavored to moderate the tide of enthusiasm. As a result he became the subject of bitter aspersion in the scholarly writings of the time. His successor, Pope Sixtus IV (1471–84), is a most difficult character to estimate. He enlarged the Vatican Library, appointing the scholarly Platina, in disgrace under his predecessor, its librarian. He built the Sistine Chapel and invited Perugino, Ghirlandaio and other great painters to decorate it. He adorned Rome with a number of magnificent public structures and was a munificent patron of literature and the printing press. He continued, however, the unfortunate nepotism which marked Papal policies at this time, and used some most dishonorable means to further his political aims. His successor Innocent VIII (1484–92) had been married earlier in life and his son had married the daughter of Lorenzo de' Medici. As Pope, he entered into a close alliance with the de' Medici and made Lorenzo's son, Giovanni, a Cardinal when only 13. He debased Papal power for political purposes, yet devoted himself to allying the Christian princes and peoples in a new Crusade against the Turks but without success. He succeeded however in reconciling the rivalries of the great noble houses in Rome and putting an end to the feuds which had disturbed the city so that the Romans conferred on him the honorable title of "Father of his country." Innocent's successor was another Borgia, Pope Alexander VI (1492–1503), whose character is one of the most disputed in history. Roscoe, the English historian of Lorenzo de' Medici, began the protest against the traditional history of Alexander. His life was irregular before he ascended the Papal throne. He has suffered for the faults of his children, whom he idolized. Historians are agreed now that he has been fearfully calumniated. The charges of poisoning and other horrible crimes imputed to him by the scandal mongers of the time have been completely disproved. As a Spaniard making his way in Italy, he was the subject of bitter ill-will and his repression of the feudal aristocracy at Rome and his political opposition to the French made him enemies who stopped at no mode of discrediting him. His daughter Lucrezia has been completely vindicated by Gregorovius and though her name was a by-word in history, her people of Ferrara followed her to the tomb as a saint and her husband, the Duke d' Este, was inconsolable.

The end of the century was the scene of the career of Girolamo Savonarola (1452–98) who about the time that Columbus discovered America, alarmed by the pagan elements which had been stealing into social customs during the Renaissance, preached penance and reform to the Florentines. He stirred them so deeply that the women brought their finery and jewelry and the ornaments, personal and of the household, and piled them in the streets to be burned. The fervid preacher then suggested that Florence should become a Theocracy and Christ be proclaimed king. This invasion of politics brought about his downfall, and he was condemned to death, burned, and his ashes thrown into the Arno.

Savonarola has often been proclaimed a pre-Reformation reformer, but he was a faithful Dominican, the prior of his monastery, and a devout adherent of the old Church. He recognized abuses and strove to correct them and never doubted for a moment that the mission of the Church to men had been impaired by these abuses. Even popes since have suggested the possibility of his canonization and his name has been thoroughly vindicated.

The characteristic product of the time in contrast with Savonarola, showing how the same period may produce the opposite extremes, is Machiavelli. He was born in the next decade after Savonarola (1469), and went through the penitential period at Florence as an acquaintance at least, of the great Dominican, and yet was the writer early in the next century of works in political philosophy that represent a climax of utter lack of principle.

The early century was the scene of the rebellion of John Hus, the Bohemian reformer, who had taken up Wyclif's doctrines and was condemned for them by the Council of Constance (1415). He was handed over to the civil authorities and put to death because it was felt that the teaching of his doctrines would be subversive of authority in both Church and State. Hus's doctrines had been examined by Jean Gerson. the Chancellor of the University of Paris, who warned against their heretical character. Hus's execution was followed the next year by that of Jerome of Prague, but this was only the beginning of very serious religious disturbances which waged in Bohemia for more than a generation. The most important question was whether the laity should partake of the chalice as well as of the Host of the Sacrament of communion, and it was not settled until 1485, when King Wladislaw granted equal liberties and rights to both parties. By degrees then, the Utraquists (from Latin, utraque, both, in reference to the Sacrament in both kinds) conformed to the Roman rights and in the next century resisted the Lutheran reform even better than the Subunists (under one kind).

This century saw the invention of printing which has been declared the most important and the most perilous discovery in the annals of history. Printing blocks for the making of playing cards and of certain pious pictures had been in use during the later Middle Ages. On these were cut some lines of text and from this to the making of whole pages in this way was but a step and a number of books were printed in this fashion in the first half of the 15th century. The next step was the invention of movable letters and this was accomplished very probably by John Guttenburg (1400–68) of Mainz in Germany. The oldest printed book from movable types was a Latin Bible issued by Guttenburg and Faust at Mainz about 1455. Before the close of the century, there were presses everywhere. Italy particularly took up the new art with the greatest enthusiasm and Venice alone had some two hundred printing presses before 1500. The most important chapter in the history of printing is the story of Aldus Manutius (1450–1515) who established the Aldine Press. He published some magnificent editions of the classical authors, securing as editors some of the great scholars of the time. The most beautiful printed books ever issued were produced during this first half century of printing. When William Morris in England in the last generation of the 19th century wanted to restore printing to the art that it had been, from the mere cheap handicraft that it had become, he went back to take as models for his work some of the beautiful printed editions of the later 15th century. It was a time too of beautiful bindings, so that books fitted admirably into the charming interiors that were being made at this time. The first half of the century had seen the making of beautiful illuminated books so that the printers had fine models before them and it is not surprising to hear that when a great book collector of the time was asked to purchase printed books, he scornfully refused to add any "machine made volumes" to the beautiful collection of hand-made books that had been his life's devotion. Books were extremely valuable and even printed books were very dear, so that in libraries to which any number of people were admitted, books were chained to the shelves, quite as in our time we lock up expensive editions.

The 15th century continued that striking evolution of education which had marked the 14th. Altogether 18 universities were founded in the 14th century, and some 29 in the 15th. Saint Andrew's in Scotland is a type of the university foundation of the time. It was established by Bishop Wardlaw in 1411, but he was very proud to announce to the masters and students that his authority for doing so came from the Pope, and when the university had completed its first year a formal Papal Bull of erection was issued. The practice, in a word, was not unlike that in effect in our time, schools being required to do some work and a report as to their efficiency and the need for them being demanded before formal recognition by authorities. Glasgow followed Saint Andrew's in 1454, and Aberdeen received its charter 1477. Altogether some 80 universities, for there is some dispute as to whether certain institutions deserve the name of university or not, had been founded before the 16th century.

No less than seven universities were founded in Germany in the second half of the century, and this fact alone shows how deep was the interest in things intellectual at this time. They are Greifswald (1456); Basel and Freiburg (1460); Ingolstadt (1472); Treves (1473), and Tübingen and Mainz (1477). As Wittenberg was founded in 1502 and Frankfort-on-the-Oder in 1506 no less than nine universities were established in Germany in these 50 years. The endowments of these came in the order of importance from the clergy, the princes, nobles and burghers, though even the poorer classes and those living on the land were sufficiently interested in education to leave legacies for the benefit of needy students which did much to encourage the educational movement.

As the Renaissance advanced, the Greek classics were read not only for their value as literature but also for their content in science. The result was a reawakening of interest in the physical sciences which was destined to produce important results. The study of Ptolemy aroused an interest in mathematics and astronomy, while the issue of Galen in the original reawakened attention to clinical medicine. Pürbach at Vienna (1423–61) and Johann Müller (1436–76) known as Regiomontanus after the fashion of Latinizing the names of scholars at that time, devoted themselves to the study of Ptolemy, and though both died in early middle life, their names have been deservedly remembered. The most important personality in the scientific development of the time was Nicholas of Cusa, a fellow student at the University of Padua of Toscanelli who influenced Columbus so much. The attitude of the Church toward science at the time is well illustrated by the fact that Cusanus as he is called was made Bishop of Brixen, Apostolic Delegate to Germany and finally Cardinal. Cantor in his 'History of Mathematics' devotes a score of pages to Nicholas. His ideas in astronomy are well represented by his declarations that the earth was not the centre of the universe; that it moved in the heavens as the other stars, and could not be absolutely at rest. His thoughts with regard to the constitution of the sun are surprising anticipations of modern ideas. He suggested the correction of the calendar and the use of laboratory methods in the study of disease that give him a place in the history of medicine. Cusanus' best known work is his 'De Docta Ignorantia,' (On Learned Ignorance)—in which he points out how many things there are which people think they know that are not so.

The curiosity of men was aroused, and astronomy received an impetus which was to culminate in the career of Copernicus, who was 27 before the century closed. The physical science of the time came in geography. The Portuguese proved hardy navigators and under the inspiration of Prince Henry the Navigator (1309–1460) penetrated farther and farther into the mysterious seas to the south of them baring the secrets of the African coast. In 1448 the Azores were discovered. About the middle of the century, the Guinea coast was explored and some of the black men carried to Portugal as slaves, creating the negro problem as well as the slave trade. The explorations continued because it was hoped to find a trade route to the Indies. It was not until 1486 that Bartholomew Diaz reached the southern part of Africa which he called the Cape of Good Hope, because at last the road to India lay open. The extreme length to which Africa extended made the journey long and rounding the Cape was dangerous, and so with the idea that the earth was only half the size it really is, Christopher Columbus, a native of Genoa, proposed to travel westward. After his scheme had been rejected as visionary by a number of governments, Columbus finally obtained the help of Isabella and rediscovered the Western Hemisphere 1492. He thought he had reached some part of the Indies, hence the name West Indies and the term Indians. Up to his death he probably never knew that he had really found a New World. Amerigo Vespucci a few years later reached the Continent and described it in a widely read book and the Western Hemisphere was named America for him. In 1498 the Portuguese reached India proper by the African route and founded the Indian Empire. This led to dislocation of the eastern trade from Venice to Portugal.

Medicine received a new impulse at the end of the 15th century, and the two most important personages in it are Leonicenus and Linacre. Leonicenus was professor of medicine at Padua, Bologna, and Ferrara and noted for his knowledge of Latin as well as of medicine. He made a famous translation of the Aphorisms of Hippocrates. He was no mere translator and commentator however but a practical scientist whose most important work was the correction of the botanical errors in Pliny's Natural History. Leonicenus also wrote on certain clinical problems of his day, notable *lues*. The problem whether syphilis was introduced into Europe from America or not at the end of this century is considered by some as unsolved, but there are now many documents and traditions pointing to its European existence for centuries before, and the treatment of it by mercury had even been worked out. The technique of some of the surgeons of this century show that the old form of anæsthesia survived, and that a great many operations subsequently abandoned, to be revived at the end of the 19th century were being performed.

The greatest benefit conferred upon medicine at this time was the printing in magnificent scholarly editions of some of the classics in medicine. This led to their preservation, and though many of them were lost sight of and their significance unappreciated until the last generation, the printed editions were in many libraries waiting for modern students and ready to be reprinted. Above all, the Renaissance printers preserved for us the books of the great teachers of the later Middle Ages, of the surgeons of Salerno, of Theodoric and Bruno, of Guy de Chauliac, and of others which were circulating in manuscript and were liable to be lost. The Italian medical schools were waking up to the study not only of Greek medicine but also of clinical medicine by observation and the value of pathology for the real meaning of disease. Beniveini (died 1502), besides being an able surgeon wrote "the only work on pathology which owes nothing to any one," (Malgaigne). Medical students from many countries in Europe found their way to Italy; among them Linacre from distant England, and Copernicus, physician as well as astronomer, from Poland, so that the tradition of going to Italy for advanced medical studies became the condition so notable in the next century.

The obligations which wealthy men felt toward their less favored brethren during this century can be readily appreciated from the careers of some of the men who, having made a fortune in trade in London, proceeded to spend it for the benefit of their fellows. Dick Whittington of the nursery tale, who became Sir Richard Whittington, Mayor of London, made most of his benefactions early in this century, but his career belongs more to the 14th and has been treated there. The typical merchant prince of the 15th century is Sir Hugh Clopton of Stratford-on-Avon, who having left his native town and made his fortune in London, returned to Stratford to lavish benefactions on his townsmen. He built the beautiful stone bridge across the Avon which still stands and which was sadly needed, for the old wooden bridge was dangerous in the spring freshets and even lives had been lost. He rebuilt the Guild Chapel in the charming form that has made it the admiration of visitors to Stratford ever since and restored the almshouses meant particularly for old couples to live together during their declining years when they had passed their usefulness. Mr. Sidney Lee in his 'Stratford-on-Avon' has told of Sir Hugh's beneficence in his will. "He bequeathed also C. marks to be given to xx. poor maidens of good name and fame dwelling in Stratford, that is to each of them five marks apiece at their marriage; and likewise Cl. to the poor householders in Stratford." The custom of giving dowries to girls on their marriage so that the little household might start housekeeping without debt for their furnishings, was a very common practice at the end of the Middle Ages. This period saw also the establishment of the so-called Monts de Pieté, that is public offices where the poor when in need might pledge their belongings to receive them back after paying the loan. These foundations were made as a remedy for the evils occasioned by the usury of money lenders. The founder was Bernadine of Feltre, a Franciscan, and it came to be a common practice for rich people in their wills to leave a certain amount of money for the redemption of such pledges for the most deserving poor. The social organization of the period deserves study beside its art consideration.

JAMES J. WALSH,
Author of 'The Thirteenth the Greatest of Centuries.'

PRINCIPAL EVENTS OF THE FIFTEENTH CENTURY.

1401. The Renaissance in Italy awakens the spirit for learning and the fine arts.
1403. Yunglop, son of Hong-wu, dethrones his nephew and makes Peking the capital of China. Frames the Chinese code of laws. Maintains a fleet that dominates the East, and receives foreign ambassadors.
1411. Saint Andrew's University, Scotland, founded.
1413. Henry V becomes king of England.
1415. Battle of Agincourt. Henry V of England conquers Normandy. John Hus condemned by the Council of Constance and burned.
1416. Jerome of Prague burned for heresy.
1420. Hussite wars begin.
1422. Henry V of England becomes king of France. Constantinople besieged by Amurath, the Turkish emperor.
1429. Joan of Arc raises the siege of Orleans.
1431. Joan of Arc burned at Rouen by the English.
1440. Printing, long known by the Chinese, invented in Germany by Gutenberg.
1448. The Azores discovered by Portuguese navigators.
1450. Jack Cade insurrection in England.
1451. The English evacuate Rouen and other French towns.
1453. The Turks capture Constantinople under Mahomet II, and with the extinction of the Comneni and Palæologi the Eastern Empire ends.
1454. Glasgow University founded.
1455. War of Roses begins in England. The battle of Saint Albans. First book printed from movable types.
1456. Siege of Belgrade. Turks repulsed by Hunyadi.
1456–1477. Seven universities founded in Germany.
1457. Glass first manufactured in England.
1461. Louis XI of France begins to reign.
1468. Louis XI imprisoned by Charles the Bold.
1469. Machiavelli born.
1477. Aberdeen University founded.
1479. The kingdom of Spain formed by the union of Aragon and Castile.
1483. Richard III of England the usurper.
1484. The Inquisition established in Spain.
1485. King Ladislas of Bohemia grants religious liberty.
1485. Battle of Bosworth, England. Richard III slain. Henry VII succeeds.
1486. Bartholomew Diaz reaches the Cape of Good Hope.
1487. The Court of Star Chamber instituted in England.
1492. Columbus rediscovers America. Granada falls and the Moors are driven out of Spain.
1494. Charles VIII invades Italy.
1497. Cabot discovers North America.
1498. Portuguese navigators reach India around the Cape of Good Hope. Savonarola condemned to death and burned.

FIFTH, one of the five equal parts into which any unit may be divided. In music, the dominant or fifth note above the tonic or keynote; the second of the consonances in the order of their generation; a combination comprising four intervals, of which there are three kinds, namely, the perfect fifth (C—G), consisting of three whole tones and a semitone; the flat, diminished, or imperfect fifth (B—F), consisting of two whole tones and two semitones; and the extreme sharp, or superfluous fifth (C—G sharp), composed of four whole tones. As consecutive fifths do not produce a good effect, they are not allowable in harmony.

FIFTH CENTURY. The 5th century has its special place in history as the period of culmination of that decadence of human interests under the stress of barbaric invasions which is coincident with the fall of the Western Empire. The last of the Roman emperors whose title Romulus Augustulus so fittingly concludes the list of rulers at Rome, was dethroned by Odoacer, king of the Herulii, who founded the kingdom of Italy (476). The battle of Adrianople (378), in which the Goths defeated and slew the Roman Emperor Valens, destroyed the prestige of the Empire. The barbarians, as all those who were not Romans were called, had learned that they could defeat the Roman legions, and while they were induced to accept peace for the time, it was only by strengthening the Roman army by taking into it foreign soldiers and leaders that even a precarious peace at intervals could be procured. Among the Germans given an important post in the Roman army was Alaric. He collected an army composed mainly of West Goths or Visigoths and, dissatisfied with the treatment accorded him, marched on Rome which he captured and plundered (410).

He did not seriously damage the city but Rome's reputation suffered disaster. After this, barbarians were not deterred by any feeling of the inviolability of the capital of the Empire, and the Empire itself ceased to be an object of respect. Alaric died and the West Goths wandered through Gaul and then into Spain where they established a kingdom under Eric (468). They found in Spain another German tribe, the Vandals who began their wanderings shortly before Alaric captured Rome. After ravaging Gaul, they had settled in Spain but now under pressure from the Visigoths, they crossed the Straits of Gibraltar and established a kingdom in northern Africa. Wherever they went they left destruction in their path, so that the word «Vandal» became the term for such destructiveness. Meantime the Angles formed their kingdoms of Anglia (England), the kingdom of France was founded by Clovis (481), Italy was conquered by Theodoric, the king of the Ostrogoths who put Odoacer to death (493). While the Western Empire was thus dismembered, the Eastern Empire was stripped of Pannonia, Dalmatia and Noricum. For a time, the Eastern Empire, under the regency of the young Emperor's sister Pulcheria in the early century, enjoyed a period of peace and prosperity, but the one saving feature of the century's almost continual warfare is the battle of Chalons-sur-Marne, the first battle of the Marne in history, which ended with the complete defeat of Attila and his Huns (451). Attila had created an empire reaching from China to the Atlantic at the north and he was endeavoring to extend his sway over the southern countries when he met this severe check. Undefeated in spirit, the Hun went on another raid in 452, this time in northern Italy, destroying Aquileia, the mistress of the Adriatic, so completely that only a trace of it remained. The inhabitants took refuge in the lagoons, to found what has since become Venice. Verona, Padua, Bergamo and Fienza shared Aquileia's fate, while Milan and Parma had to buy off «the Scourge of God,» who did not hesitate to attribute to himself Divine assistance and direction in his work of destruction. He announced that he was the agent of God's vengeance on the western nations. In 453, Attila led his troops toward Rome. He was met not far from Mantua by Pope Leo I, the Great, who succeeded in persuading him to withdraw his troops from Italy, and obtained from him the promise of opening negotiations for peace with the emperor. Under the influence, it is said, of a dream in which he had seen this venerable man who had come to plead with him, Attila consented, and a treaty with the Emperor Valentinian was signed. The Hun returned to Pannonia, where he died not long afterward, and his great army without a leader gradually disintegrated. The protagonists who thus met on the banks of the Mincio are the two men who for good and ill have most deeply impressed themselves on the century. The position of moral influence which the Pope had acquired by this time may be appreciated by a similar incident two years later when Gaiseric King of the Vandals captured Rome. At the intercession of the Pope, Gaiseric spared the city.

Leo I, the Great, as he has been called, begins the line of popes of that name, so many of whom have been distinguished. It has been said that his pontificate, next to that of Saint Gregory I, is the most significant in Christian antiquity. He acquired prominence very early, being sent to Gaul as a comparatively young man by the Emperor Valentinian III, to bring about a reconciliation between the military and civil authorities of the province, who were at loggerheads and threatened a disruption of the peace of the empire. He was somewhat known in the west of Europe before this for the great mystical writer Cassian had dedicated a book to him. He accomplished his mission for the emperor so well that though he was absent in Gaul at the death of the Pope, he was chosen as successor. His pontificate was in a stormy time, as can well be understood from his experiences with Hun and Vandal, and besides, there were serious internal troubles in the Church, widespread heresies, that threatened disruption. In spite of all these handicaps, Leo succeeded in maintaining ecclesiastical discipline and fostering the intellectual and spiritual life of Europe.

The greatest political character of the century is Theodoric, King of the Ostrogoths. He defeated King Odoacer at the first battle of the Isonzo (489), and after several further defeats, concluded peace with him. The two kings were to live together in Italy, Odoacer being subordinate. The following year Odoacer was slain at a banquet, and Theodoric became the sole ruler. He came to be the subject of a whole series of myths, particularly in the old High German, under the name of Dietrich of Bern (approximate German pronunciation of Theodoric of Verona). He ruled in northern Italy for 33 years, and succeeded in incorporating in his dominions Sicily, Noricum, Istria, Pannonia and Dalmatia. He was the first ruler of history to maintain a standing army. He had 100,000 men, all Goths, and a fleet of 1,000 ships, manned also by Goths, for the protection and extension of his domains. He used his own people for war, employing the Romans in the business of administration and encouraging their devotion to commerce and industry. At heart a barbarian, he had many good traits, and his motto is said to have been «Let other kings gain booty and half-ruined towns by war and slaughter; my object is, by God's help, to conquer in such a way that my subjects may regret that they did not come under my rule before.» His reign in many ways justified even that lofty maxim. He stained his reign by the martyring of Böethius, but was very fortunate in the Prime Minister to whom he gave his confidence, Cassiodorus, but these details belong to the next century. In the closing year of the 5th century, Theodoric issued an edict embodying the principles upon which he hoped to govern. It was founded on Roman law and its aim was to secure the education of the Goths in Roman culture until there could be a union of the two peoples on an equal plane. In his youth a hostage in Constantinople, Theodoric had come under the influence of Byzantine art and literature, not yet in that decadence which was to come a little later. The memory of the city aroused in him a sense of rivalry and created a reverence for the old monuments of art in Italy, and he did his best to preserve the magnificent Roman remains then in existence, and to adorn further the Italian cities. While a Christian, Theodoric had embraced Arianism and this serously complicated matters in the ruling of his kingdom.

The greatest intellectual force of the 5th century was Saint Augustine (354–430), Bishop of Hippo, whose work has continued to influence men deeply ever since. Schaff says of him, «Compared to the great philosophers of past centuries and modern times, he is the equal of them all; among theologians he is undeniably the first, and such has been his influence that none of the Fathers, Scholastics or Reformers has surpassed it.» His life is the best key to his times. He received a Christian education but put off receiving baptism. He prayed, he tells in his Confessions, but without the sincere desire of being heard and drifted through the experiences of many a young man in the larger cities at almost any time. The surprise is to see how closely the elements which influenced Augustine 1,500 years ago resemble those of our generation. As he tells himself, the licentious example of other students, the attraction of the theatre, the intoxication of his success as a writer and a scholar, and his pride of always being a leader in everything even evil, joined to the seductions of a great city, still more than half pagan, led him into sad ways in Carthage where he was studying law. The devotion of his mother Monica finally brought him to his better self but not until he had experiences that gave him the material for his 'Confessions,' the most attractive personal book, it has often been declared, that was ever written.

He was 33 when he went to Saint Ambrose at Milan to be baptized on Easter Day. Now he was whole-hearted in his Christianity. He resolved to give up all he possessed to the poor and take up a life of poverty, prayer and study. He kept his resolutions so well that in admiration at his change of heart so finely maintained, the people demanded that he be made a priest, and the old Bishop of Hippo forced him to become his coadjutor with the right of succession. As Bishop of Hippo Augustine wrote his immortal works in defense of the Church. He has more deeply influenced the thought of Christianity than any other except possibly Saint Paul. He treated the most difficult questions, grace and free-will for instance, exhaustively and a great many heretics have insisted on finding a foundation for their teachings in expressions of his. Augustine is the principal Christian authority on nearly all the difficult problems of faith and it is surprising how many anticipations of what is often considered to be modern thought are in his writings. Augustine's teaching was for instance, that the seven days of creation were not literal periods of 24 hours but that creation had been instantaneous and only the seeds of things had been created (*semina rerum*), and these had gone on developing afterward. (See MAN, CHRISTIAN ANTHROPOLOGY OF). His philosophic and theological teaching with regard to the human will and its place between its own freedom and divine grace is a marvelous contribution to human psychology in the deep analysis of motive and purpose which he has made. Augustine's exposition of human ways and moods as he saw them makes it perfectly clear that men have not changed in any way in the millenium and a half since his time.

A series of events that were to have great significance on the continent of Europe began in Ireland about 432. Saint Patrick converted the Irish to Christianity, and in the course of the next century Ireland became the land of saints and of scholars. While the Continent was in the throes of perpetual conflict through the Goths, Eastern and Western, and the Vandals and Huns, a series of Christian schools developed in Ireland which were to send out scholarly missionaries bearing Christianity and education to the Continental barbarians for the next three or four centuries. Ireland, untouched by the Romans,— Cæsar had planned to send an expedition there, but was prevented by death and his successors in command of the Roman armies were too much occupied,— failed to share in Roman decadence. Saint Patrick found a people who had an abiding interest in poetry and other phases of literature, a genius for music and a great talent in the arts and crafts. Their tribal rule had fostered dissensions among them and Christianity did not tame their martial instincts but it turned the national energy into higher channels and their high stage of social life and their respect for the rights of others was refined by Christianity.

The result of this educational development was that Ireland protected from the disturbances of the Continent at this time became a Mecca for students from Britain, Iberia, Gaul and it is said even more distant countries. Besides Irish missionaries went to the Continent and founded schools, not only in Gaul and in what is now Germany and Switzerland, but even in Italy where the great monastery of Bobbio is one of their foundations. Mrs. Richard Green suggested that any one in Western Europe who spoke Greek during the 6th and 7th centuries owed it either to an Irishman or to some one who had been taught by an Irishman. The great Irish schools were situated at Armagh, Bangor, Clonfert, Clonmacnoise, Glendalough, Tuam, and on the Island of Arran More. The women of Ireland shared with the men in this educational development, and Saint Brigid's school at Kildare became as well known as Saint Patrick's school at Armagh, and according to tradition had hundreds of pupils devoted not only to book learning but above all to the arts and crafts. Kildare became famous for its fine lace making, needle work, beautiful church ornaments, marvelous illuminated copies of the Scriptures, rivals of the Book of Kells, still preserved at Trinity College, Dublin, for one of them has been described by Giraldus Cambrensis who fortunately saw it not long before the destruction of Kildare by the Danes. Gerald the Welshman was most enthusiastic in his descriptions of this book. Some of the earliest poems in rhyme ever written were composed here at Kildare as a recent revival of Gaelic literature has revealed, and manifestly there was a high state of intellectual development. The abbesses at Kildare, successors to Saint Brigid, had the privilege of vetoing the names of candidates for the bishopric of Kildare whenever they felt they might not be in sympathy with the educational work done there. The abbess ruled over a monastery for men as well as a convent for women, though the men were much fewer in number. It was this Brigittine tradition that was in force at Whitby (North England) when the Abbess Hilda ruled the convent and monastery. The Irish opportunities for feminine education form a striking pioneer epoch in history.

Ozanam, in ‘La Civilization au Cinquième Siécle,’ declared that «the Irish were the missionary people of the barbarous ages, destined to carry the light of faith and science into the gathering darkness of the West. They are a people whose sufferings are better known to us than their services and whose marvelous vocation we have not sufficiently studied.» He proceeds to add that «the Romans were too old and worn out to complete the education of the on-coming race, so that it required a new generation of non-decadent people to continue the chain and rejoin the links.» Zimmer, the distinguished German authority on Celtic history and literature, in his discussion of ‘The Irish Element in Mediæval Culture,’ declared that «these Irish missionaries were teachers of every known branch of science and learning of the time, possessors and carriers of a higher culture than was at that period to be found anywhere on the Continent, and can surely lay claim to have been the pioneers, to have laid the cornerstone of Western culture on the Continent.».

The Franks come into prominence in this century. They gave a new name to Gaul and became the nucleus of the modern French nation. At the fall of the Roman Empire, one of their chieftains, Clovis (later form, Louis), ventured to attack Syagrius, the Roman Governor of Gaul, and gained a decisive victory at Soissons (486). He then began to extend his authority over neighboring Teutonic tribes who had also crossed the Rhine and taken possession of different portions of the country. He extended his kingdom as far south as the Loire and then proceeded to conquer the Allemani to the east. One of his battles with them represents a great turning point in history. Clovis was not yet a Christian, though his wife was, and he had learned to respect her religion deeply. In the midst of a battle with the Allemani the fighting was so fierce that his troops began to give way, and bethinking himself of the God of the Christians, he promised that he would become a Christian if the Franks should gain the victory. The great Bishop Gregory of Tours, in his famous ‘History of the Franks,’ written in the next generation, has told the story of how, when the battle was won, Clovis kept his word, and with more than 3,000 of his warriors, was baptized.

Clovis thus founded the Merovingian dynasty, so called from one of their earlier chieftains, Merovig, and before the end of the century ruled from the Rhine to the Bay of Biscay, except Brittany, all of what is now North France and the Netherlands, while to the southeast the Burgundians, another German people, ruled the country round Lyons and the Visigoths held the southwestern France and Spain. These barbarian folk, however, instead of clinging to their own language and laws, almost without exception adopted the customs and the language of the Romans. This makes it clear that they must have been comparatively few in number, but their bravery enabled them to impose themselves as the ruling class though they were soon absorbed into the populations among whom they dwelt. Their Teutonic brothers left beyond the Rhine, kept their own language, but the Franks adopted the conversational Latin of the time and then gradually modified it more, as also happened in other southern countries, until the modern Romance languages came into existence. Even their own special laws came to be written in the Latin language for use in the established courts alongside the Roman Law.

The work of Clovis is the most far-reaching of the time. That of Theodoric was destined to destruction within a generation but the kingdom of the Franks was under successive dynasties to remain a power in Europe and to be the great bulwark against further Germanic invasion of the South, even as late as the 20th century. It was extremely difficult even for Christianity to modify the nature of these rude Germanic peoples, and their barbaric traits were constantly manifesting themselves in the bitter internal dissensions which occurred for several centuries and in the cruelties which they practised. Recent discoveries reveal, however, that in the arts and crafts they did some very beautiful work in the Merovingian period, specimens of which fortunately have been unearthed in our time. Gradually the spirit of Christianity refined their natures, but without overcoming the vigorous racial peculiarities which made their presence in the decadent Roman Empire so important for the renewal of civilization that was destined to come.

The women of the 5th century played a much more important rôle than would usually be thought possible at the beginning of what used to be called the Dark Ages. Indeed, a period of comparative peace and opportunity for progress in the Eastern Empire was due mainly to a great woman ruler. When Arcadius, the son of Theodosius the Great, to whom the Eastern Empire had fallen by his father's will, died in 408, he left the empire to his son, Theodosius II, who was only seven years old. Arcadius' reign of 30 years had been one long series of disturbances after another. Rebellion within the empire was due to tyrannical invasions of the rights of the people, palace quarrels, incursions of barbarians from without. The outlook was not bright for the boy emperor. Fortunately his sister Pulcheria, much older than he, was a strong character and maintained her brother's rights. In 414 she was proclaimed Augusta and became Regent. She fulfilled her duties as a ruler with magnificent administrative ability and selected generals who compelled the Huns to retire from Thrace and the Scirians, a people scarcely less to be feared than the Huns, were entirely subdued. The Illyrian towns were better protected than they ever had been before under the Eastern Empire.

With all this administrative ability, Pulcheria was a woman of strong piety yet of a very simple, retiring disposition, and her sister being much like her, the imperial palace took on the appearance almost of a convent. She had no ambition to continue in power, and when Theodosius was 20 years of age she turned over the government to him and helped to arrange for him the marriage with Athaneas, daughter of the Athenian philosopher Leontius, who at baptism took the name of Eudoxia or Eudokia. Theodosius continued to depend on her however, and Pulcheria's talent for administration materially helped the Empire in stormy times. Pope Leo the Great who had turned aside the wrath of Attila and of Gaiseric from Rome, looked upon her as his ablest coadjutor for the conservation of Christianity. He wrote to her that the suppression of the dangerous Nestorian and Eutychian heresies were due largely to her. In the midst of all this, Pulcheria somehow found the time to spend many hours in personal service to the poor. She came to be looked upon according to an expression of the time as "a tender sister of those who needed help." Saint John Chrysostom, the famous Bishop of Constantinople, consecrated 398, had at the beginning of the 5th century erected a hospital at Constantinople and made a magnificent beginning of the organization of social work which had been rudely interrupted by his banishment. Pulcheria took up this work, founded a series of hospitals and of shelters for the poor — *multa publica hospitum et pauperum domicilia* (Old Chronicle). Her example of piety and charity had much to do with mitigating the asperities of the religious division which in the East at this time was so prone to take on a character of bitter intolerance and cruel persecution. No wonder she is venerated as a saint by the Greek and the other Oriental churches and by the Latins.

It is a noteworthy fact that after the external persecution of the Church stopped, internal dissensions and heresies of various kinds seriously disturbed Christian peace. The end of the 4th century saw the beginning of the unfortunate series of divisions, but there was scarcely a decade of the 5th century that did not witness some heretical development. Arianism declined, but subtle distinctions were made, and the Monophysite heresy declared that there was but one nature in Christ. Then the question of free will and predestination came up, and Palagianism had to be controverted and then semi-Palagianism, a sort of compromise. The Nestorians insisted that the Incarnation meant no more than an indwelling of the divine nature in Christ, and that consequently God had not been truly made man. There were two persons, one divine and the other human, and it was of the human person that Mary was the mother. It was around this last question that the popular heresy turned. A series of Ecumenical, that is universal, councils were held to contradict these heresies. The first of these, held in Nicea or Nice (325), corrected the Arian teaching. The second Ecumenical Council of Constantinople (381) concerned the teaching as to the Holy Ghost; the third that of Ephesus (431), corrected the errors of Nestorius and Palagian, and the fourth, that of Chalcedon, was against the Monophysites (451). In the meantime a number of less important Councils and Synods were held in various parts of the world for the correction of various phases of these heresies and the development of church regulations.

Eudoxia, the contemporary of Pulcheria, was almost an exact contrast in many ways to her sister-in-law — a contrast historically illuminating, for it exhibits the same variety of character in the 5th century as at all other times. She finds a place in history as the result of a romance which would usually be supposed to be reserved for modern centuries and be quite impossible under the conditions of Oriental life even among Christians. She was just the handsome, vivacious 20-year old daughter of a professor at Athens who lavished his erudition on her. The young emperor Theodosius saw her and was struck with her beauty and intelligence and fell in love with her. His sister Pulcheria arranged the marriage. The young Empress of the East soon found to her disappointment that while she swayed her husband's heart, she could not influence his administration as she wished, for with regard to that he turned to his sister Pulcheria. After 20 years of Imperial life, she fell under the suspicion of marital infidelity, probably unjustly, but was forced into retirement at Jerusalem. Here she spent the last 20 years of her life in good works and quiet meditation at the Holy Places. She wrote a series of poems, mainly on religious subjects, though one had for its theme her husband's victory over the Persians. Her most famous work is a paraphrase of the Bible in verse which has been warmly praised by commentators. Her excellent sense of literary values is best revealed by the fact that we owe to her the primitive literary form of one of the world's great stories. This is the tale of Cyprian and Justina, that is of a man who sold his soul to the devil for knowledge and when dissatisfied with this, afterward for a woman. This later became the Faust legend, so often turned to by great poets as a nucleus around which to gather their thoughts with regard to human life. Calderon uses the story in its earlier Christian form almost as it came from the hand of Eudoxia as a plot for his greatest play, 'El Magico Prodigioso'; Marlowe in the specious Elizabethan period wrote his greatest drama around it, while Goethe made from it the great literary masterpiece of the 19th century. The Faust legend and the Arthur legends, both from this time, have been great resources for the modern poets.

The literature of the 5th century is of no great significance and yet there are some names in it that have lived. Claudian or Claudianus, the Latin poet, probably died just as the century was opening. Prudentius and Ausonius, Christian Latin poets, left verses that are well known and some of the hymns of Prudentius are still in use in the Church. Macrobius, a Platonic philosopher, and Isidore and Socrates who wrote ecclesiastical history and Orosius, a Spanish disciple of Saint Augustine, are still referred to by those who care to know the history and thought of the time as it appeared in the eyes of contemporaries. Sozomen and Theodoret, further ecclesiastical historians, are also well known. The time was waking up to the necessity of telling its story if that was to be known by posterity.

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PRINCIPAL EVENTS OF THE FIFTH CENTURY.

400. Alaric the Visigoth invades Italy.
406. German tribes invade Gaul.
407. The Salians, the chief tribes of the Franks settled in Belgium. Burgundians from the Vistula cross the Rhine.
409. German tribes invade Spain.
410. Alaric captures and plunders Rome.
411. Burgundians pass through Germany into France and settle on the Rhone.
418. The Visigoths enter Gaul and Spain, and found the kingdom of the Visigoths at Toulouse.
420. The Long dynasty is established in China by General Lieoyu.
426. The Romans, threatened at home, withdraw from Britain, advising the Britons to arm and trust in themselves.
431. The council of Ephesus.
432. Patrick the apostle converts Ireland to Christianity.
439. The Vandals who had absorbed Alani invade Africa and capture Carthage.
440. Leo I, the Great, bishop of Rome.
447. The Huns under Attila ravage the Eastern Empire and make Constantinople tributary.
449. Vortigern, king of the Britons, asks the aid of Saxons from the Elbe and Weser against the Scots and Picts.
451. The Council of Chalcedon. Attila invades the West and is defeated at Châlons.
453. He invades Italy, and dies suddenly.
454. The Ostrogoths are subdued by the Huns.
455. The Vandals under Genseric or Gaiseric return from Africa and loot Rome. The Saxons establish themselves in Kent, England, under Hengist and the Britons are driven into Wales and Cornwall.
462. The Visigoths in Gaul and Spain.
474. Having extended their territory in Galicia, Spain, and on the Rhone and Loire, Gaul, the Visigoths adopt the written law.
475. Romulus Augustulus, the last Roman emperor.
476. He is deposed and the western Roman empire ends. Odoacer becomes king of Italy.
482. Clovis becomes king of the Franks occupying the territory from the Rhine to the Seine and Loire.
489. The Goths under Theodoric invade Italy.
492. Gelasius becomes Pope of Rome.
493. Theodoric becomes king of Italy.
495. The West Saxons land in Britain.
496. Clovis, king of the Franks, becomes a Christian. Sclavonian tribes from Russia, following the migration of nations and occupying Eastern Europe from the Oder to the Adriatic, seize Poland and Bohemia.

FIFTH MONARCHY MEN, a set of politico-religious enthusiasts who sprang up during the Protectorate of Cromwell. They believed that the four great kingdoms mentioned by Daniel, the Assyrian, the Persian, the Grecian, and the Roman, were to be followed by the descent of Christ, to establish a fifth monarchy, which was to be of world-wide extent. They thought that this advent was close at hand, and that physical force should be employed to pave the way for Christ's reign. When the sect, who were of the extreme republican type, fancied Cromwell was aiming at the royal title as well as power, they raised a conspiracy against him (1657), which was quickly discovered. Their leaders were thrown into prison, and were only liberated on the death of the Protector. The sect became extinct shortly after the Restoration, not, however, until on 6 Jan. 1661, they had attempted to obtain possession of London. Most of the participants were either killed or captured and ten of the latter, together with their leader, Venner, were executed for high treason later in the month. Consult Brown, L. F., 'Political Activities of the Baptists and Fifth Monarchy Men, etc.' (in 'Prize Essays of American Historical Association,' Vol. V, Washington 1912), containing a very full bibliography.

FIFTH NERVE, the chief sensory nerve of the face, also called trigeminus, or trifacial. It is one of the fifth cranial pair of nerves. The fifth nerve is one of the most important sensory nerves of the body, its name trafacial meaning that it has three large divisions which are distributed to the face, and its name trigeminus being given because it has three roots inside the skull. It is really a mixed nerve containing both motor and sensory fibres. The motor root rises from a group of cells lying deep in the floor of the fourth ventricle. The sensory portion arises in a series of ganglia, the Gasserian ganglion being the most important one. The ophthalmic and Meckel's ganglia are also smaller ganglionic centres. The chief branches go to supply the eutire area of the skin of the face and head, and neuralgias and neuritides of the face and head are due to affections of this nerve. The chief division is the first or ophthalmic division, which supplies the region over the superior surface of the nose, forehead and eye, running as far back as the top of the head. The second branch is the superior maxillary, which supplies the tooth and the region of the skin beneath the orbit, the upper lip, and the region of the temple. The superior maxillary nerve contains a few motor fibres. The third branch, the interior maxillary, or mandibular, is the largest branch of the fifth nerve, and contains most of the motor fibres. It supplies the surface of the skin of the lower jaw, front of the ear, and temporal region, lying close behind the area supplied by the maxillary. The muscles of the jaw, the masseters, temporals and buccinators are supplied by the motor fibres of this branch. See CRANIAL NERVES; FACIAL NEURALGIA; NEURALGIA.

FIFTY-FOUR FORTY OR FIGHT, the slogan of the Northern Democrats in 1844; meaning the insistance upon the line of lat. 54° 40′ N. as the southern limit of English possession, even at the price of a war. The Ashburton Treaty of 1842 had created great dissatisfaction as a surrender of American rights (and in England as a surrender of British rights), and the hot-heads wished to abrogate it. But the Southern leaders did not wish to make war for the increase of the free territory, and instead diverted the war sentiment against Mexico, forcing on the Mexican war of 1847. See BOUNDARIES OF THE UNITED STATES; OREGON QUESTION.

FIG, the fruit of the *Ficus carica*, a native of Asia, Africa, and the south of Europe, which has been cultivated from antiquity in the countries surrounding the Mediterranean, where figs form a principal article of food in many places. It belongs to the family *Moraceæ*. The male and female flowers are mixed indiscriminately on the inside of a fleshy receptacle, which is concave in form, with its edges drawn together into a narrow opening. What are called the seeds in the ripe fig are really the fruits, each containing a single seed. The fig-tree is distinguished from almost all others by the extraordinary property of producing two crops of fruit in the same year on distinct shoots, in climates congenial to its growth. The shoots formed by the first or spring sap put forth figs at every eye as soon as the sap begins to flow again in July and August. These figs which form the second crop of the year ripen in their native climate during the course of the autumn. The shoots formed by the second flow of sap, commonly called midsummer shoots, put forth figs in like manner at every eye, but elsewhere not until the first flow of sap in the following spring. These last-mentioned figs, which form the first crop of each year, ripen in warmer climates during the months of June and July, but not in the United States before September or October. The fig-tree, in its wild state, is a low, distorted shrub, bearing fruit destitute of any agreeable flavor. Dried figs are easier of digestion and more nourishing than the fresh fruit, and form a considerable article of commerce. The best come from Turkey, Italy, Spain and Provence; those of the Archipelago are inferior in quality. Dried figs, with barley bread, are now the ordinary food of the lower classes in Greece and the Archipelago. While the edible fig of commerce can be raised over the whole United States south of Philadelphia, fig culture was never considered a practical venture until a few years ago. American figs even in such a climate as California were shrunken and sour for the most part, and the dried Smyrna fig was still imported to the United States to the value of about $700,000 a year. As the price of other kinds of native fruit decreased, because of overproduction, many Californian orchardists and horticulturists turned their attention to the fig, which is among the costliest of dried fruits, being valued at from $200 to $400 a ton in the New York market. Cuttings of the Smyrna fig were imported to this country as early as 1880, but the fruit proved shrunken and tasteless. It was found necessary to start from seedlings and for this process caprification (q.v.) was necessary. In 1891 a consignment of *Blastophaga grossorum* was brought to this country. It was received by James Shinn of Niles, Cal., who had planted a caprifig tree in his orchard as a hospice for the insects. He failed of success through the lateness of the season at which he made the experiment, which, however, was repeated by George C. Rœding of Fresno, Cal., who met with complete success, and now Smyrna figs are produced in California as large and highly sugared as those which can be imported.

A modern discovery of great importance to the fig industry is that insect-bearing caprifigs may be packed in boxes with alternate layers of figs and sand and so preserved through severe winters. Besides the caprifig and the Smyrna fig numerous other species are grown. Most of these attain an edible perfection without the aid of pollen of the caprifig and without developing seeds. Of these Mission figs bear two crops annually in California and most of the Southern States. The San Pedro figs, grown in the same regions, bear only one crop. The fig is propagated by budding, grafting or by cuttings. Cuttings serve the purpose best and are usually made from the ripened wood of the previous season's growth. The tree is long-lived and requires about 40 feet each way to avoid crowding. In America the most extensive orchards are in California where the low rainfall permits the fruit to reach its full development. In this State are produced all the dried figs grown in America. The output is increasing steadily and now exceeds 10,000,000 pounds annually. The canned-fig industry is assuming important proportions in the Gulf States within recent years. Consult Bailey, 'Cyclopedia of Horticulture' (New York 1914); Van Velzer, 'Fig Culture' (Houston, Tex., 1909); «The Fig» (California Board of Horticulture, Sacramento 1890); «The Fig» (Bulletin 9 of the United States Department of Agriculture, Division of Pomology, Washington 1901).

FIG-EATER, a beetle of the genus *Allorhina*, harmful to figs. See June Beetle.

FIG FERTILIZATION BY INSECTS. It was known to the ancients, according to Pliny and others, that the cultivation of certain varieties of figs was dependent for fertilization (technically termed caprification) upon the friendly aid of a minute hymenopterous insect termed the fig-wasp (*Blastophaga grossorum*). Beginning about 1890 numerous attempts were made to introduce the Smyrna and caprifigs in fig-growing sections of America. Recognizing our inability to fertilize the female varieties which were introduced, experiments were made with mechanical pollination the following year on the Smyrna fig by Dr. Gustav Eisen. Attempts were then made to introduce the Blastophaga, but without success, until the United States Department of Agriculture succeeded in establishing the insect in 1899 in the fig orchard of Geo. C. Rœding, at Fresno, Cal. The principle of the fertilization is that the Blastophaga in its native home in the Mediterranean region breeds naturally in the wild or caprifig. The Smyrna fig does not mature fruit unless the flowers are cross-pollinated by hand methods or through the agency of the Blastophaga, which carries pollen from the male caprifig to the female Smyrna fig, hence both the caprifig and the Blastophaga are necessary in order that the commercial fig bear edible fruit. The results of the introduction of this fig-fertilizing insects have exceeded the most sanguine expectations In 1900 a large crop of Smyrna figs were raised, dried and placed on the market and tests made by experts showed that California figs fully equal the imported product and that they contain a larger percentage of sugar, a superior flavor and are cleaner and more attractive in appearance. With this introduction a new horticultural industry of great future value to the country has been established. Over 10,000,000 pounds of figs are produced annually in California. The United States Department of Agriculture has published much information on this subject, two important papers being Howard's 'Figculture in the United States' (1900); and Eisen's, 'The Fig, Its History, Culture and Curing' (1901). Consult also Bailey, 'Standard Cyclopedia of Horticulture' (New York 1914); Van Velzer, 'Fig Culture' (Houston, Tex., 1909); «The Fig» (California Board of Horticulture, Sacramento 1890).

FIG SHELL, the shell of several species of gastropods, so called from its shape. It is especially used to designate the shells of the genera Ficula and Pyrula.

FIGARO, fē'gạ'rō', **Le Nozze di**, opera buffa in four acts by Wolfgang Amadeus Mozart (libretto by Lorenzo da Ponte after Beaumarchais' «Mariage de Figaro») first performed at Vienna 1 May 1786. Mozart himself suggested the use of the satirical comedy that had made all Europe its home and the success of the opera was from the first assured. The complicated plot, laid in Spain, tells of the cross-currents of intrigue of Count Almaviva with Susanna, the countess' maid, who is betrothed to Figaro, the barber of Seville and of the countess with the page Cherubino. Figaro, becoming jealous of the count's actions, conspires with the countess and the other two to punish him for his love-making. Needless to say, he is pardoned and all ends merrily with the union of Figaro and Susanna. Mozart's treatment of the story lifts it far above the cynical atmosphere of the original text into a purer ether where it is invested with the poetic and delicate charm that Mozart's genius alone could create. The situations are vivid and picturesque and the delineation of character full of subtle touches. Figaro, the countess, Cherubino and Susanna are creations which stand upon their own feet and breathe their own air, vitalized with the life and art perhaps of another day, but none the less reasonable and consistent. The music is one steady flow of motion and melody, an irresistible combination of grace, serene beauty and musicianship. In spite of its age and the great intervening musical development, it has lost none of its freshness. In the first act, occurs Figaro's celebrated aria «Non piu andai,» the effect of which at the first general rehearsal, was electrical, cast and orchestra calling out «Brava, brava, Maestro! Viva! Viva! il grande Mozart.» In the second act are the countess' aria «Porgi amor,» full of a gentle melancholy, Cherubino's ever sweet and fresh «Voi che sapete» and the finale upon which Mozart lavished his greatest gifts. The «Dove sono» aria of the countess, the exquisite letter duet between her and Susanna, also called the «Zephyr Duet» and Figaro's stirring march number «Ecco la marchia» of the third act and the «Deh vieni» for Susanna in the last act may also be singled out for special mention.

Lewis M. Isaacs.

FIGEAC, J. J. Champollion. See Champollion-Figeac.

FIGEAC, fē'zhạk', France, the capital of an arrondissement in the department of Lot, on the Orléans Railway, 45 miles east northeast of Cahors, on the Célé River. It contains several old houses of the 13th and 14th centuries, the church of Saint Sauveur, dating from the 12th century and Notre Dame du Puy of the same period. Figeac is the seat of a subprefect and has a tribunal de premier instance and a communal college. Its industries comprise brewing, printing, tanning, weaving and the manufacture of agricultural implements. It has also a large trade in cattle, wool and grain. The town grew up around a monastery founded here in the 8th century and for several centuries was the property of the monks. Pop. 5,808.

FIGGIS, John Neville, English clergyman and author: b. Brighton, 2 Oct. 1866. He was educated at Brighton College, Saint Catherine's College, Cambridge, Wells Theological College. In 1894–95 he was curate of Kettering and in 1895–98 at Great Saint Mary's, Cambridge. From 1895 to 1901 he lectured in Saint Catherine's College and was chaplain of Pembroke College in 1898–1900. In 1900 he was Birbeck lecturer in Trinity College and from 1901 to 1907 was rector of Marnhull, Dorset. He was Noble lecturer at Harvard in 1911 and Bishop Paddock lecturer at the General Theological Seminary, New York, in 1913. In 1915 he was Bross lecturer at Lake Forest, Ill. Since 1909 he has been a member of the Community of the Resurrection. His publications include 'The Divine Right of Kings' (1896); 'Illustrations of English History, 1660–1715' (1902); 'Christianity and History' (1904); 'From Gerson to Grotius' (1907); 'The Gospel and Human Needs' (1909); 'Religion and English Society' (1910); 'Civilization at the Cross Roads' (1912); 'Antichrist' (1913); 'Churches in the Modern State' (1913); 'The Fellowship of the Mystery' (1914) 'Some Defects in English Religion' (1916); 'The Will to Freedom.' lectures on Nietzsche (1917) and contributions to the 'Cambridge Modern History'; with R. V. Laurence he edited Lord Acton's 'Lectures and Essays.'

FIGHTING-FISH (*Betta pugnax*), a small fish of the climbing perch family (*Anabasidæ*) a native of the southeast of Asia, remarkable for its pugnacious propensities. In Siam these fishes are kept in glass globes for the purpose of fighting and extravagant gambling takes place on the result. When the fish is quiet its colors are dull, but when irritated it glows with metallic splendor. The king of Siam derives a considerable revenue from the licenses for fish-fights.

FIGHTING JOE HOOKER, a nickname popularly applied to Gen. Joseph Hooker (q.v.).

FIGHTING PARSON, The, a nickname given to William Gannaway Brownlow (q.v.), in reference to the vigorous anti-secession leaders written by him for his newspaper, *The Whig* of Knoxville, Tenn.

FIGIG, fē-gēg, a town of considerable importance in Morocco; situated on the east bank of the Wady Zusfava, which separates Algeria from Morocco. Figig is several hundred miles from the seacoast.

FIGLINE, fē-lyē'nā', Italy, city of central Italy, 25 miles southeast of Florence on the Cerno. Straw hats and knives are manufactured and there is a brisk trade in oil, silk and wine. Nearby many fossil remains of the mastodon, hippopotamus, etc., have been found. Pop. 12,035.

FIGUEIRA (fē-gā'ē-rạ) **DA FOZ**, Portugal, a seaport in the district of Coimbra, on the Mondego River and on the Lisbon-Figueira and Guarda-Figueira railroads, 25 miles southwest of Coimbra. It has a large coast trade in grain, fruit, wine, oil and cork, but its port is hampered by a bar at the mouth. It has manufactures of glass and its climate and sea-bathing facilities attract a great number of summer visitors. It became a city in 1882. Pop. 6,221.

FIGUERAS, fē-gā'rās, Spain, town, 14 miles from the French frontier in a plain 21 miles north-northeast of Gerona. It is defended by a fortress, considered the strongest in Spain and the key to the Pyrenees. It is large enough to accommodate 16,000 soldiers. It has some manufactures, chief of which are woolen and linen fabrics, leather, soap, corks, etc., and a trade in these and in grain, oil and liquors It has been four times in French occupation, in 1794, 1808, 1811 and 1823. Pop. 11,778.

FIGUERAS Y MORACAS, fē-gā'rās ē mō-rā'kās, **Estanislao**, Spanish statesman: b. Barcelona, 13 Nov. 1818; d. Madrid, 11 Nov. 1882. He studied law at Madrid and early in life began political activity in the Republican party. He was elected deputy from Barcelona 1851, becoming a leader of his party, but was exiled for participation in the plot against Narvaez for a few months in 1867. After the fall of Queen Isabella he continued to oppose actively the restoration of the monarchy. Upon the abdication of Amadeus in 1873 he became president of the council of ministers, but after the restoration of the monarchy in December 1874, took no further part in public affairs.

FIGUEROA, fē-gā-rō'ā, **Francisco de**, Spanish poet: b. Alcala de Henares, 1540; d. 1620. He was called by his contemporaries "the Divine Figueroa," and at Rome he won the poet's crown. He wrote verse with equal facility and elegance in Castilian and Italian. When dying he burned all his verses; but they were published — including the celebrated volumes of eclogues in blank verse, the 'Tirsi'— from copies in the hands of his friends.

FIGUEROA, Francisco, Mexican annalist: b. Toluca 1730; d. City of Mexico 1800. He was a Franciscan priest and taught and lectured acceptably, but his great service to literature consisted in the compilation of materials for a history of Mexico, among them a 'History of the Conquest of New Galicia,' by Mota Padrilla, besides diaries and letters.

FIGUEROA, Francisco Acuña (ā-koon'-yā) **de**, Uruguayan poet: b. Montevideo, 1791; d. there, 6 Oct. 1862. A civil-service post afforded him leisure to prepare his 'Poetic Mosaic' (1857), a verse collection, and his more notable 'Paraphrases of the Psalms'; and 'The Toráidas,' a series of Paraguayan notes. He has been assigned a high rank by competent European critics; lofty inspiration and sonorous diction being his characteristics, as exemplified in the 'National Hymn of Uruguay.'

FIGUIER, fē-gyā, **Guillaume Louis**, French scientist: b. Montpellier, 15 Feb. 1819; d. Paris, 12 Nov. 1894. He was for a time professor in the School of Pharmacy of his native town, and in 1853 was appointed to a post in a similar school at Paris. Among his works are 'Exposition et Histoire des Principales Découvertes Scientifiques Modernes' (6th ed. 1862); 'Histoire du Merveilleux dans les Temps Modernes' (1859–62); 'L'Alchimie et les Alchimistes'; 'Vies des Savants Illustres depuis l'Antiquité jusqu'au XIX Siècle' (2d ed. 1875); 'Les Grandes Inventions'; 'Le Tableau de la Nature' (1862–73); 'Le Lendemain de la Mort' (10th ed. 1894); etc. Several of his works have been translated into English, including different sections of the 'Tableau,' such as 'The Mammalia'; 'Birds and Reptiles'; etc.

FIGULINE, potter's clay; also, ware made from potter's clay, especially pottery decorated with reliefs of natural objects.

FIGURE, in *arithmetic*, a character employed to represent a number. The Arabic figures are 1, 2, 3, 4, 5, 6, 7, 8, 9, 0, by combinations of which any possible number can be represented. In *logic*, the form of the syllogism with respect to the position of the middle term. In *music*, a form of melody or accompaniment maintained throughout the phrase in which it is suggested. In a melody, figure is called sequence. In harmony, a figure relates to the rhythmical observance of a certain form in all the accompanying chords to the melody. Also a musical phrase, or a florid melody. See NOTATION.

FIGURE or **FORM** in philosophy. See FORM.

FIGURED BASS, or **THOROUGH-BASS**, in music, a bass having the accompanying chords suggested by certain numbers above or below the notes. It is a satisfactory system of musical shorthand which originated in the 16th century. As a simple method for musicians to distinguish at sight the harmonies of extended compositions. The whole of the notes are not always indicated by a corresponding number of figures, because one number generally implies two or more to complete the chord. When there is no figure, it is understood that the common chord of such a note is to be used as its harmony.

FIGUREHEAD, an image, either head or bust, placed at the prow of ships. Such figures were carved in wood in the days of wooden vessels, and there was generally some connection between the figure and the name of the vessel. Thus, a vessel called the *Lion* would have at its prow a lion's head carved in wood and gilt. In modern vessels of iron and steel, with the usual straight stem, the old forms of figurehead, etc., have disappeared. Whenever ornamentation is now employed on the prow it is generally limited to a shield bearing a coat of arms, or scroll-work in gold, but the general tendency is to dispense with such ornamentation altogether.

FIJI (fē'jē) or **VITI** (vē'tē) **ISLANDS**, a large group of islands in the South Pacific, belonging to Great Britain, situated between lat. 15° 48′ S. and 20° 4′ S. and between long. 177° 51′ E. and 178° 38′ E. There are 255 islands, great and small, of which about 80 are inhabited. The uninhabited islands scarcely rise above the level of the sea. Including Rotumah, which belongs to the same jurisdiction, they have an area of 7,435 square miles, of which the main island Viti Levu takes up 4,250 square miles, and Vanua Levu 2,600 square miles. Suva, on the south coast of Viti Levu, is the capital and has a fine natural harbor. The whole group is of coral formation, and all the islands seem originally to have formed portions of Viti Levu, some of them probably of Vanua Levu. The conformation of the main island is volcanic and side by side with volcanic deposits are granite, diorite, gabbros and syenite. The silent craters are most numerous in Taviuni. Among valuable metals found in the islands are gold, copper and iron. The islands lie in the track of the monsoons, which blow strongly from April to November, rendering the islands exceedingly healthy; there is an abundant rainfall (109–112 inches), the maximum temperature is 90° and it seldom falls below 60°. The flora of the Fijis is very like that of the East Indian mainland. Up to the summits of the volcanic peaks stretches a luxuriant growth of tropical vegetation. The forest has little underwood, but abounds in palms, tree ferns, bamboo and orchids of tree-like dimensions. The fauna belongs to the south Australo-Polynesian group; bats and rodents are the only mammals in the islands. There are about 50 species of birds, of which the most notable are doves and parrots. The native population is gradually decreasing. The Fijians were once idolators, but since the arrival of English Wesleyan preachers in 1835 they have turned to Christianity. There are 10,880 Roman Catholics in the islands and 84,185 Wesleyans. The principal occupation of the people is agriculture; the sugar, maize and cocoa culture is prosperous, but cotton growing has declined. Tropical fruits are exported to Australia and New Zealand. Many herds of swine run wild in the forests. Imports (1914) £911,274; exports, £1,389,865. Revenue (1914) £279,845; exports, £301,351. In 1914, 143 vessels entered, of a total of 351,345 tons.

A disquieting feature in the life of the islands has been the decline in the native population, which has fallen from 150,000 to 87,000. The ravages of measles, typhus and dysentery operating in virgin soil, especially among infants, has brought about this decline, which is now, however, arrested. The natives, who belong to the Malayo-Polynesian race, are of fine physique, muscular and athletic; their language is Melanesian, with an admixture of Polynesian words. They are intensely conservative in habits and customs: the loin-cloth has not given place to pants; they still fashion a tree-trunk into canoes and live in thatched huts just as their forefathers did. They are skilful navigators and expert potters. The greater part of the land is in their hands, one peculiarity of tenure being that ownership of fruit-trees and crops is held quite independently of ownership of the soil. The islands form an important link in the chain of British trade and influence in the Pacific, having steam communication with Australasia, Samoa, Honolulu and Canada, and serve as links in the All-Red Cable Route between Australia and Canada.

Some of the Fiji Islands were discovered by Tasman in 1643; they were visited by Captain Cook in 1773; and explored by Dumont d'Urville in 1827. They were constituted a British colony in 1874. The governor is assisted by a nominated executive council, and by a legislative council, 11 of whom are officials and seven elective (including two natives). Pop. (1911) 139,341 (Europeans 3,707); estimated (1915) 155,167. Consult Cumming, 'At Home in Fiji' (London 1887); Churchill, 'The Polynesian Wanderings' (Washington 1911); Grimshaw, 'Fiji and Its Possibilities' (New York 1907); Thomson, 'Fiji Past and Present' (Melbourne 1899), and 'The Fijians: A Study in the Decay of Custom' (London 1908); Williams, 'Fiji and the Fijians' (London 1870).

FILAMENT, in botany, the stem of a stamen, supporting the anther. (See FLOWER). It is usually filiform, but sometimes curiously modified.

FILANDER, fĭ-lan'dėr, a small kangaroo (*Macropus bruni*), native to New Guinea. It was the first of the kangaroos (q.v.) known to Europeans.

FILANGIERI, fē-lăn-jā'-rē, **Gaetano,** Italian political economist: b. Naples, 18 Aug. 1752; d. 21 July 1788. His great work, entitled 'The Science of Legislation,' notwithstanding it was never completed according to his original design, attracted great attention, from its bold and original views and the liberality of its sentiments. In 1787 he was made a member of the supreme council of finance.

FILARETE, fē-lä-rā'tĕ, **Antonio,** or **Antonio Averulino,** called ANTONIO DE FIRENZE: b. Florence, about 1400; d. Rome, about 1469. He worked under Ghiberti on the famous baptistery gates. Pope Eugene IV gave him a commission to make the bronze doors for Saint Peter's in Rome, and he began their execution with assistants about 1439, finishing them 1445, the whole being a feeble imitation of Ghiberti, in bad taste and entirely lacking in spontaneity. He also made a bronze reduction of the equestrian statue of Marcus Aurelius for the capitol, now at Dresden, and a mausoleum of the cardinal of Portugal, which disappeared in the 17th century. He is, however, more noted as an architect. Banished from Rome 1449, on the accusation of stealing relics, he entered the service of the Sforza family at Milan, drawing plans for a great hospital in the antique style, only one wing of which he finished. He is the author of a remarkable book, 'Tratto di Architettura,' written before 1465, a treatise on architecture in 25 volumes, a sort of a verbose and finical romance, of which the motive is the construction of an ideal city, called Sforzinda. The undercurrent of the work is a mixture of pagan and Christian philosophy and ethics and an inculcation of didacticism in art.

FILARIA, long slender threadworms or Nematoda (q.v.), parasitic in man and other vertebrates. The species found in man parasitize the connective and lymphatic tissues in the adult condition; their minute larvæ (microfilariæ) produced in countless numbers, circulate in the blood from which they are transferred to new hosts by the mosquito, or are discharged into standing water, as in the Guinea worm, and reach man again after a stage in small water animalcules (Cyclops).

FILARIASIS, fil-ạ-rī'ạ-sis, a group of diseases caused by nematode worms (see NEMATODA) of the genus *Filaria,* some species of which are parasitic in man and domestic animals. The *Filariæ* are very slender worms, mostly parasitic in subdermal connective tissue and in serous cavities. The developmental history is not entirely elucidated, but they seem to undergo indirect development in the body of some crustacean or insect, species of mosquitoes notably serving as intermediary hosts. Under the term *filariæ sanguinis hominis,* old authorities include the species *F. bancrofti, F. diurna,* and *F. perstans,* the last the parasite to which the sleeping-sickness of the negroes in Africa has been attributed. The most important one of these is *F. bancrofti,* whose numerous embryos enter the blood through the lymphatics, and are present at night in the blood, although usually absent in the daytime. This worm (the male) is about 1½ inches long and from 1-10 to 1-12 of an inch broad. The female is almost twice this size. This parasite may be present in the blood without giving rise to any symptoms, but frequently they block the lymph-channels and produce the conditions of elephantiasis. These forms of lymph-scrotum, and of hematochyluria, exist very extensively in Asia and Africa, and within recent years have been found in cities in the southern United States. (For lymph-scrotum and elephantiasis, see ELEPHANTIASIS). In hematochyluria the patient, while in excellent health, suddenly passes a large amount of urine of a peculiar whitish or milky-whitish appearance, occasionally bloody; or frequently a fluid resembling chyle, which on settling shows the presence of a blood-clot. This chyluria seems to be intermittent, the patient being well for weeks or months at a time, and then passing large quantities of this modified urine. The embryos are to be found in this urine. Occasionally there are symptoms of uneasiness in the loins and lumbar region, but as a rule the general health is not affected. The treatment is prophylactic solely.

Another form of filariasis is "guinea-worm," a disease produced by *F. medinensis.* It has been known from time immemorial, and it has been fancied that the plague of fiery serpents which afflicted the children of Israel in the wilderness was really an irruption of such worms. This worm is thought to be bred in the body of some minute aquatic crustacean, as *Cyclops,* and thence to enter its final host, which may be the horse, dog, wildcat or jackal, as well as man, by the drinking of the water. The form of disease brought about by *F. medinensis* is extremely common among African negroes. In certain provinces of India sometimes nearly one-half the entire population are affected; and it is known in Russia, Turkestan and Hindustan. The adult female worm usually finds its way into the subcutaneous connective tissue, generally in the lower extremities, especially in the feet or ankle. It has also been found in the arm, eyelid, tongue, perineum, scrotum and trunk. The presence of the worm is not apparent until it bores its way to the skin. Here it produces a painful swelling which later becomes irritable and sore, and finally there develops a suppurating sinus. The worm may be expelled spontaneously from the sore, or it may be taken out in native fashion. *F. loa* is a similar species, limited in its distribution to the west coast of Africa, where it is not uncommon, and is introduced into man by means of drinking-water. It is an active worm, passing rapidly through the connective tissue, and is very frequently found in the region of the eye, where it bores its way to the conjuctival surface. Filaria loa was for a long time considered a very rare human parasite but in the last ten years many cases of human infection by this worm have been described. Hitherto considered a parasite invading the eye only it has been found in a number of other localities. In fact its presence may be anywhere in the connective tissues following the bite of an infected insect. It then bores through various tissues of the body, often giving rise to local swellings, named variously, Calabar swellings, etc., and may emerge from any part of the body. In as much as emergence from the eyeball makes a striking difficulty the idea originated that it was an eye parasite. The loa parasite is chiefly a native of Africa. It was introduced into the West Indies, and the chances are that with the very active mingling of races incident to the World War there will be numerous cases in the United States. There are a number of minor filaria parasites the exact nature of which can be ascertained from monographs published.

Consult Stedman, 'Reference Hand-Book Medical Sciences'; article, 'Nematodes and Trematodes'; Manson, 'Tropical Diseases'; Nuttall, 'The Role of Insects, etc., in the Spread of Parasitic Disease'; (Johns Hopkins Hospital Reports, Vol. VIII, No. 1); Braun, 'Thierichen Parasiten' (1902).

FILBERT. See HAZLENUT.

FILDES, fĭldz, SIR **(Samuel) Luke,** English portrait and genre painter: b. Liverpool 1844. His first Academy picture was 'Nightfall' (1868), and among other pictures since then he has exhibited 'The Loosened Team' (1869); 'Fair, Quiet, and Sweet Rest' (1872); 'Simpletons' (1873); 'Applicants for Admission to a Casual Ward' (1874); 'Betty' (1875); 'The Widower' (1876); 'Playmates' (1877); 'The Return of the Penitent' (1879); 'The Village Wedding'; 'Venetian Life'; 'The Al-fresco Toilette'; 'The Doctor' (1892), and state portraits of King Edward and Queen Alexandra. Several of these, particularly his famed 'Casual Ward,' show powers of realism in painting not unlike those of Dickens in fiction — for whom he illustrated 'Edwin Drood'— but his later works are more striking from their color-effects. He was knighted in 1906.

FILE-FISHES, the fishes of the plectognath family *Monacanthidæ*, so-called from their skins being roughened by minute rough scales. The species are numerous, small, plain in color, herbivorous, lean and not good for food; and are mainly found in the tropical seas. The best known American species is *Alutera schœpfii*, which ranges as far north as Cape Cod, and often shows a decided orange tint upon its olive-gray sides. It reaches a length of 24 inches, as also does its relative the unicorn-fish (*A. scripta*) of the West Indies. A different and much smaller file-fish is the widely distributed «leather-fish» or «fool-fish» (*Monacanthus hispidus*). The Spanish-American fishermen give the name «lija» to all these fishes. These fishes were formerly classified with the trigger-fishes (q.v.) in the family *Balistidæ*, from which they differ conspicuously in having but one erectile dorsal spine. Consult Gunther, 'Study of Fishes' (1859); Goode and Bean, 'Oceanic Ichthyology' (1895).

FILELFO, fē-lĕl'fō, **Francesco,** Italian philosopher: b. Tolentino 1398; d. 1481. His early studies in grammar, rhetoric and Latin were made at Padua. In 1417 he was invited to teach eloquence and moral philosophy at Venice. He acquired a great reputation and became intimate with the leaders of literature and politics in Venice. In 1419 he was honored with the appointment as secretary to the Venetian consul-general at Constantinople. There he mastered the Greek language under Chrysoloras, whose daughter he married. He acquired a priceless collection of Greek manuscripts, which he brought to Italy in 1427. The remainder of his life was spent in lecturing in various cities, Bologna, Florence, Siena, Milan, in writing numerous works illustrating authors, and in disputes with rival scholars. He did much for learning through his enthusiasm for the ancient school and his collection of writings. Consult Rosmini, Carlo de', 'Vita di Filelfo' (Milan 1808); Symonds, J. H., 'Renaissance in Italy' (London 1877).

FILES AND FILE-MAKING. The file is a steel instrument with sharp ridges or teeth made by the indentations of a chisel, and used in cutting down and shaping metals or other hard substances. It is one of the oldest of hand tools. It is mentioned in the Old Testament scriptures, and probably came into use not very long after man began to work iron. Files were commonly made by hand until about 1850, when machine-made files became general. The first machine proposed for making files was suggested to the French Academy of Sciences in 1702, but it was not until 1812 that the first United States patent on a file-making machine appeared, being taken out by Morris P. Belknap. The files in ordinary uses are made of high-grade steel, from 6 to 14 inches in length being the most common sizes. The pointed end that fits into the wooden handle is called a tang, and the corner formed by the junction of the tang to the body of the file is called the heel. Occasionally they are made with a tang at both ends. The cutting face or faces of a file are formed by the blows of a chisel struck in the file-blank, while the steel is still soft. The closeness and depth of these cuts determines the character of the file, as rough, middle-cut, bastard, second-cut, smooth and dead smooth. When the cuts are crossed so as to form teeth, as in the more common styles, it is a double-cut file. When the spacing between the chisel cuts is varied it is «increment cut.» Files are also named from their cross-section, as round (usually tapered, for enlarging holes), half-round, square or flat. Files for sharpening saws take their names from the kind of saw whose teeth they are shaped to fit, as cross-cut file, cant-saw file, pit-saw file, etc. Dentists' files are made with the handle in the centre, and the filing surface on either end. They are styled bicuspid file, plug file, stump file, etc., according to use. A somewhat similar file, only larger, with bent ends, is called a riffler. The files most commonly used by comb-makers are called slitting and topper files.

Double or checkering files, used by cutlers, gunmakers, etc., are practically two files riveted together, with the cutting teeth so placed that one is half way ahead of the other. These are used to produce the checkered effect peculiar to gunstocks. The files used by watchmakers are exceedingly small, fine and delicate, many of them being of less section than a fine sewing needle, and about half the length. These are named according to the part of a watch or clock on which they are used, as clock-pinion file, balance-wheel file, barrel-hole file, etc. The file proper is not a rubbing or abrading tool, as many non-technical persons suppose, but a true cutting tool, whose teeth point in one direction, and which can be used effectively only in that direction, that is when pushed away from the user. The horseshoer's rubber and the ordinary rasp are kindred tools that perform their function by being rubbed back and forth, but the file is not intended to be used in that way.

In the case of a rasp, a pointed tool is used to indent the surface of the blank, and this raises prominences on the surface that make it useful as a rubbing or rasping tool. In making files, the blank is first stamped or drop-forged from a high-grade steel, inferior or blistered steel being usable only for rubbers. The file-blank in a soft, unannealed condition, is fixed on the reciprocating carriage of a file-making machine, on a surface of lead designed not to injure the cut side of a file when down. The blank is passed slowly forward under a reciprocating chisel, whose blows descend on the blank at distances determined by the speed at which the carriage moves. In a common type of machine the chisel is moved upward by a cam and thrown down to deliver its blow or cut by a powerful spring. The cuts may be deepened by running the blank through the machine a second time. Old files may be recut in the same way. After the cutting, the file is hardened by tempering, and is then ready for use. In using a file the filer takes the handle in his right hand, with the back of the hand downward. He takes a firm hold of the point with the left hand, placing the thumb or ball of the thumb on top; or he may reverse the hands to rest his muscles. He advances the file, that is, pushes it away from him, with a parallel motion, bearing down as the file goes forward, and brings it back without pressure. The learner always has a tendency to see-saw or rock the file, which can be overcome only by practice. Unless the file is kept level, the surface cannot be cut down to a level. The use of the file in machine work has been much superseded during recent years by the introduction of the emery wheel, operated by power, against which the work is held and ground down with much reduced labor. But the emery wheel will not accomplish a great many things that can be done with the hand file, hence its manufacture is not endangered by the increased use of the wheel. See Hardware Trade in America.

FILIBUSTERING IN LEGISLATION, a term applied to the methods by which party or factional obstructionists delay the proceedings of a legislative assembly. These minority obstruction methods are usually effected by the interposition of dilatory motions, or through the refusal of members to answer to the roll or to vote, thus breaking a quorum. Before 1890, obstruction by dilatory motions had become a serious abuse, which was only remedied by the action of Speaker Reed refusing to entertain such motions. The rules of Congress as revised in 1911 declare that no dilatory motion shall be entertained by the Speaker. See Legislation or Law-making; Legislature.

FILIBUSTERS (Sp. corrupted from Dutch *vrijbueter,* our "freebooter"), originally the West Indian buccaneers; in the 19th century and now, any lawless band who attack a foreign country not at war with their own. Especially, the United States companies who used to make descents on the Spanish-American states or colonies, either from personal ambition tempted by their anarchic state, or to annex them to the Union as slave territory. Burr's Southwestern Empire was to have been the fruit of the most stupendous filibustering expedition of modern times (1806-07); Texas actually was the fruit of another, disguised as colonization. The later ones, 1850-60, were all of the second type. One of their chief promoters was J. A. Quitman of Mississippi. In 1850 he aided the adventurer Lopez to fit out abortive expeditions to Cuba, for which both companions were arrested but acquitted. In August 1851 Lopez sailed from New Orleans with 500 men and landed in Cuba, but the Cubans would not rise. Lopez's force was routed and scattered to the mountains, and he was caught and garroted. Pierce's proclamation of 31 May 1854 showed that the government would tolerate no more of this against Spanish territory; Mexico was too strong to attack privately; and Central America being the only available North American section left, William Walker (q.v.) raised a California company in 1855 and assailed Nicaragua. He defeated the government troops, captured Granada the capital, executed his principal antagonists and set up a government recognized by Pierce, which re-established slavery and invited Southern immigration. But his performances raised an insurrection, helped by other Central American states, and by a United States corporation he had foolishly plundered, and he was driven out in April 1857. On a second expedition in November, he was seized and brought back; a third was stopped by the government; with a fourth he landed in Honduras, 27 June 1860, and was defeated, court-martialed and shot. There was no more filibustering till after the War; but from 1868 till the Spanish War of 1898 there was more or less, in co-operation with the Cubans. The most noted case was of the *Virginius* (q.v.) in 1873, which was captured by the Spaniards, and the commander, Fry, with 36 of the crew, were shot.

Filibustering enterprises when they meet with failure entail loss of life and of liberty, as well as denunciation from the nation in whose aid they were organized, whereas in case of success filibusters are acclaimed as national heroes.

Among modern filibusters may be mentioned Dr. Jameson (q.v.) and his raiders in South Africa in 1895. After having been condemned to death and to terms of imprisonment by the Boer government, they were eventually turned over to the English authorities for punishment, and taken to trial in London, where they were convicted and sentenced to terms of imprisonment.

Perhaps the most noted filibuster in modern times was the Italian patriot Garibaldi (q.v.). In 1862 the Italian government was compelled to arrest him at Aspromonte in order to prevent him from carrying out his project of an armed expedition against the papal states, with which King Victor Emmanuel was then at peace, and in 1867, having managed to evade the watchfulness of the Italian authorities, he actually invaded the papal states, defeating the Pope's troops at Monte Rotonda, being afterward himself routed at Mentana by the French military force that occupied Rome. For this violation of the Italian laws on the subject of filibustering he was arrested by the Italian government after his retreat from Mentana and imprisoned for a time in the fortress of Alessandria. Other modern filibusters were M. De Mayrena, the Parisian clubman and counterpart of Alphonse Daudet's 'Tartarin de

Tarascon,' who established himself as king of the Sedangs, and who died as such in his palace in the island of Tio-Man, in the Indo-China Seas; and the Franco-American soldier of fortune and Parisian journalist «Baron» Harden Hickey, who figured for a time as prince and ruler of the island of Trinidad, on the Brazilian coast. See BUCCANEERS; FREEBOOTER; PIRATE. See also FILIBUSTERING IN LEGISLATION.

FILICAIA, fē-lē-cä'yä, **Vincenzo do,** Italian lyric poet: b. Florence, 30 Dec. 1642; d. there, 25 Sept. 1707. Some of his patriotic sonnets are famous; but his verse, though not without beauty and spirit, is disfigured by the rhetorical tricks and false conceits of the period. An edition of his works appeared at Florence in 1864.

FILICALES, fĭl'ĭ-kā'lēz. See FERN.

FILIGREE GLASS; one of the kinds of ornamental glass for which Venice was formerly celebrated, the manufacture of which has been recently revived. Small filigree canes of white and colored enamels are drawn, made of the required lengths, arranged in clusters in a cylindrical mold of the required shape, and then fused together. The canes are then aggregated by flint glass at a welding heat, and the mass twisted if a spiral ornament is desired. Vases or other objects are made of ornamental masses of this glass, blown in the usual manner.

FILIGREE WORK, a kind of ornamental work in fine gold or silver wire, wrought delicately, and generally more or less varied by the intermixture of grains or small beads of the metal, and of bands, strips or bars, to give greater strength. An immense variety of patterns can be produced, the wire being made to assume the forms of arabesques, leaf-work, etc., the parts being joined together by gold or silver solder with the use of the blow-pipe. Working in filigree is one of the most ancient and widely-spread arts. Specimens have been obtained from ancient Egyptian, Greek and Etruscan tombs, and in various parts of Asia articles in filigree have been made from the remotest times down to the present day, as in China and India. In the latter country the wire-work bears much resemblance to the old Greek filigree. An exquisite frosted effect marks the surface of some of the Greek work. After the method of producing this frosting had been lost it was revived or rediscovered. Greek filigree work was especially fine during the 4th or 5th centuries. Among the Celts, Anglo-Saxons and Scandinavians, excellent specimens of filigree were early produced, being employed in such articles as bracelets, ear-rings, brooches, etc. Old Irish filigree work was of especially high quality, particularly during the 10th and 11th centuries. The Byzantine workers in filigree were also famous, and the influence of their work was widely felt in Europe during the Middle Ages, books, reliquaries, etc., being ornamented in this manner. At Venice, and in several of the French and German towns, elegant specimens of this delicate art were manufactured as early as the 12th century. In the 17th century the art was carried to its highest perfection in Italy. The Italian peasantry, as well as those of other countries, still produce filigree work for personal adornment; and the Malta filigree is world-famous. The Chinese filigree, made mostly of silver, has not the extraordinary delicacy of some of the Malay and other eastern work. Filigree objects of great beauty of workmanship are produced in the United States.

FILIOQUE, fĭl-ĭ-ō'kwē («and from the Son»), a phrase inserted in the creed of Nicæa, or rather the Nicæo-Constantinopolitan creed, as an expression of the Catholic Church's teaching concerning the relation of the Third Person of the Holy Trinity to the Father and the Son. Before the insertion of *Filioque* that creed, in its Latin version, contained these words, *Et in Spiritum Sanctum . . . qui ex patre procedit* (and in the Holy Ghost . . . who proceeds from the Father). The addition of *Filioque* (and from the Son) after *procedit,* appears to have been made first in the churches of Spain as early as 447; it was commanded by the Synod of Toledo 653. But the addition was not adopted or approved by the Roman Church till as late as the 9th century; this, not because the *Filioque* imported into the creed a doctrine not accepted in that Church, but simply because it was not considered wise to add anything to the ancient formula of Catholic belief. The Greek Church never accepted the addition till in the council of Florence, 1439, the large number of Greek bishops and metropolitans, with the patriach of Constantinople at their head, who attended that council, solemnly subscribed to the Nicæo-Constantinopolitan *symbolum* as amended by insertion of *Filioque,* and thus effected, as they believed and as the Latin bishops believed, a reunion of the Eastern and Western Churches. At the same time the bishops representing the Latin Church in the same council, signed a solemn declaration that the formula which had been used by the Greeks, «proceeding from the Father *through* the Son» was thoroughly orthodox and consonant with the *Filioque.* The Greek Church itself did not ratify the action of its representatives in the Florence council until 1452, when they were acknowledged and promulgated in the church of Saint Sophia at Constantinople; but in a council held by the Greeks in 1472 the acts of the council of Florence were formally repudiated, and the act of re-union canceled. The two churches have ever since been separate. (See CHRISTIAN DOCTRINE, DEVELOPMENT OF, and related references). Consult Ffoulkes, E. S., 'Historical Account of the Addition of the Word Filioque to the Creed' (London 1867).

FILIPINO, fĭl-ĭ-pē'-nō, a native of the Philippine Islands. The Filipinos form a very mixed population, numbering in all about 8,000,000, and seem to represent almost every type of the human race. Some of the tribes have become more or less civilized, others live in the same barbarism as prevailed before the Spanish occupation. In the make-up of the composite Filipino, the darker substratum has been supplied by the Negrito, the Papuan, and the African negro. A copper tint has been added by the Malay and Polynesian. This infusion of fierce blood has given to the islanders their fighting qualities. There exist among them certain arts of life, and a skin of a paler hue, inherited from Japanese, Chinese and Cambodian sources. Hamite, Semite and Aryan are each said by ethnologists to contribute some elements to the life, physical, intellectual and religious of this strange people, and two centuries of uninterrupted commerce between the archipelago and South America has introduced also a strain of American Indian blood into the Filipino race.

When we come to analyze the tribes, as far as they are at present known to scientific men, it appears that the Indios, the more or less civilized natives of the archipelago, divide themselves naturally into four groups, namely, Tagals, Vicols, Visayas and Llocanes. The Tagals are palpably the most advanced in the arts of life, and number about 1,500,000. Most of them live in the island of Luzon, preferring to settle in the low-lying plains, or near streams and on the seacoast. From Luzon they extend southward, in scattered groups, through Mindoro, Marinduque, and smaller islands farther south. They cultivate the soil, raise large quantities of rice and are bold and skilful fishermen; and this active industrious life shows itself in their vigorous physique and powers of endurance. The Tagalog language is more widely spoken than any other Filipino dialect. The Llocanes, who number over 800,000, occupy territory in the extreme northern peninsula of Luzon. They form but a small tribe, and seem to be distinguished from the Tagals merely by the dialect they use. The island of Visaya is wholly occupied by the tribe from which it takes its name, and the Visayas are said to number some three millions and a quarter and to speak a distinct language which separates them from the other Malayan races of the archipelago. The Vicols number about 560,000 and are scattered over the Camarines peninsula, and occupy also the islands of Catanduanes, Burias, Ticao and a half of the Masbate. In physical type and habits of life they largely resemble the Tagals. The Sulu chain of islands, which stretches between Mindanao and North Borneo, is peopled by the Moros, who are also found on the southwest coasts of Mindanao and Balabec, as well as on the south coast of Palawan, or Paragua Island. Their original seat was undoubtedly Borneo, from which they have derived their Mohammedan faith and most of their social usages. They have nothing in common with the peoples farther north and have stoutly resisted all attempts to Christianize them. They were once the fiercest pirates of the archipelago and lived by ravage and robbery. The natives of the northern islands, upon whom they once preyed, as they learned from the Spaniards the use of firearms and modern methods of warfare, were able successfully to repel the raids of the Moros, whose primitive weapons could not cope with repeating rifles and Gatling guns.

As the mountains are the last refuge of liberty in a conquered country, so also are they the last lurking place of savagery and barbarism. The interior of Luzon and several other islands is mountainous and uncultivated; here lurk the savage tribes whom 200 years of Spanish rule failed to civilize or even subdue. These are reckoned at half a million souls, have many languages and dialects, and are in greatest force among the mountain fastnesses of central Mindanao. While some of these tribes are peaceful and inclined to commerce and industry, a large section shows the warlike spirit that urges them to live on rapine. The Negritos, or Little Negroes, dwell in the higher ranges of Luzon and Negro; they are black in skin, and dwarfish in stature; they are of low mentality, incapable of assimilation and are evidently doomed to early extinction.

The Spaniards appear to have done very little to investigate the antiquities of the Filipino races. There is a vast field of exploration open to ethnologists and archæologists in this remarkable archipelago, which possesses a literature of its own in poetry and folk-lore, and has derived from Malay and Indian invaders such arts as metallurgy and weaving, in both of which arts many of the tribes are exceedingly expert. The ethnologists of the Smithsonian Institution have already turned their attention in this direction, and the United States Treasury Department is putting every possible facility in the way of those who are trying to unravel the story of the savage navigators who first cruised in the channels of the Philippine archipelago. (See PHILIPPINES). Consult Sawyer, F. C., 'The Inhabitants of the Philippines' (London 1900); Worcester, D. C., 'The Philippines, Past and Present' (2 vols., New York 1914); and 'The Philippine Islands and their People' (New York 1898); and the publications of the Ethnological Bureau of Washington.

FILIPPI, fē-lĭp'pē, **Filippo de,** Italian explorer: b. Turin, April 1869. Becoming a member of the Alpine Club he made several Alpine ascents and accompanied the Abruzzi expedition to Alaska, of which he later wrote the narrative. He accompanied the Duke of Abruzzi to Ruwenzori, Africa, in 1906 and five years later went to Kashmir. He published accounts of these expeditions and in 1913–14 organized a second expedition to Kashmir.

FILITE. See EXPLOSIVES.

FILIX. See FERN, MALE.

FILLANS, James, Scottish sculptor: b. Wilsontown, Lanarkshire, 27 March 1808; d. Glasgow, 12 Sept. 1852. After acquiring some local celebrity in Paisley by his portrait-busts, he proceeded to Glasgow. He subsequently visited Paris to improve himself in his art and in 1836 took up his abode in London. A life-size group in marble, the 'Blind Teaching the Blind,' was exhibited by him in Glasgow and produced a great sensation. Other admirable works of his are 'The Boy and Fawn,' a statue of Sir James Shaw (in Kilmarnock) and a bust of Professor Wilson.

FILLE DE MADAME ANGOT, fēy'dĕ mạ'dăm ŏṅ'gō, **La.** Opera bouffe in three acts by Charles Lecocq (libretto by Clairville, Siraudin and König) first produced at Brussels in November 1872 and shortly thereafter at Paris. With this operetta Lecocq placed himself well in the forefront of the group of gifted men, of whom Jacques Offenbach was the leader who contributed so much to the gaiety of the Second Empire. Indeed the music was so lively, clever and characteristic and made such a hit (the original production ran 500 consecutive nights), that Offenbach's laurels seemed to be endangered. The plot, laid in Paris, in the period of the French Revolution, is chiefly concerned with the doings of Clairette, child of the market and daughter of the late Madame Angot and Ange Pitou, a revolutionary street singer, whose political songs invariably get him into trouble. Their paths cross those of Larivaudière, a powerful police official and Mlle. Lange, comédienne and favorite of Barras. But all the complications are at last happily disentangled in a more than ordinarily coherent manner. There is not a dull page of music in the score and many of the numbers are familiar even to those who have never heard a performance of the operetta. The couplets that tell the story of Madame Angot («Marchande de marée») and the Revolutionary song («Jadis les rois, race proscrite»), in the first act, the charming sentimental duet of Clairette and Mlle. Lange, the irresistible chorus of conspirators («Quand on conspire») and the waltz finale of the second and in the third act the sparkling quarrel couplets («Ah! c'est donc toi») of Clairette and Mlle. Lange and the «Mme. Angot was my mother» are only a few of the many bright numbers.

Lewis M. Isaacs.

FILLE DU REGIMENT, La. See Daughter of the Regiment, The.

FILLET. (1) In ordinary language, a narrow band of metal linen, or ribbon worn round the head. Sacred fillets were those worn by the priests of Greece and Rome. Also portions of meat or fish removed from the bone and served either flat or rolled together and tied. (2) In architecture a small flat face or band used principally between moldings to separate them from each other in classical architecture; in the Gothic, Early English, or decorated styles of architecture, it is also used on larger moldings and shafts. Also the projection between the flutes of a column. (3) In anatomy, that part of the sensory nervous tract lying in its passage from the decussation of the sensory columns to the internal capsule. Disease or disturbance of the fillet usually results in a form of generalized anæsthesia. See Hemianæsthesia; Hemiplegia.

FILLEY, Chauncey Ives, American politician: b. Lansingburg, N. Y., 17 Oct. 1829. He received a private and academic education and entered commercial life as a clerk. He designed and controlled his own pottery patterns and became the largest importer and distributor of queensware in the Mississippi Valley. He became interested in politics and was a delegate to the Republican National Conventions from 1864 to 1896 and was a member of the National Committee of his party in 1876–92. In 1863–65 he was mayor of Saint Louis and was a member of the convention which abolished slavery in that State. In 1873–78 he was postmaster of Saint Louis. He did much to improve the politics of his city and State.

FILLMORE, Millard, American statesman, 13th President of the United States: b. Summer Hill, Cayuga County, N. Y., 7 Feb. 1800; d. Buffalo, 8 March 1874. He was descended from New England parentage and reared to the hard life of a frontier farm in western New York. He studied law at Buffalo and began the practice of his profession in 1827 in the neighboring town of Aurora. In 1830 he moved to Buffalo and formed, with Nathan K. Hall and Solomon G. Haven, a law partnership which soon became well-known throughout the region. But he had already served two years in the New York legislature and identified himself with the repeal of the harsh law of the State for the imprisonment of debtors. In 1832 he was sent to the national House of Representatives as a follower of Henry Clay. During the next decade he alternated between membership in the House and the work of his profession, building all the while a state-wide reputation as a political leader. As a result of the «landslide» of 1840 he found himself in Congress and chairman of the House committee of ways and means and as such he drew the tariff bill of 1842 which became a law and also set in motion the free trade influences of the lower South. He was thus a representative of the industrial and financial interests of the North against which the South and West made an alliance in the presidential campaign of 1844. He became a candidate for the governorship of New York upon the retirement of William H. Seward in 1844 and was defeated by Silas Wright, the democratic candidate. Three years later he was elected comptroller of the State of New York from which office he was chosen in 1848 to be a candidate for the vice-presidency with General Taylor. Taylor and Fillmore were elected. By this time a sharp difference of opinion between the Seward and the Fillmore men had developed. Seward, Wed and Greeley labored hard and long to gain the favor of the new President. They were successful. Fillmore naturally tended to a closer support of Clay, who manifested a hearty ill will toward Taylor. Fillmore was inaugurated vice-president in March 1849; Seward became a member of the Senate in December following. The division in the Whig party of New York was typical of the larger division in the party as a whole. When President Taylor took a vigorous stand against the threats of Southern leaders to secede in 1849–50, Seward and most of the Northern Whigs supported him and seemed ready to take the chance of civil war. But Fillmore drew still nearer to Clay and the southern Whigs, endeavoring to avoid conflict by compromise. Thus when Congress took up the problem of restricting slavery in the territories acquired from Mexico, the administration took one view while the great leaders of the party in Congress took another. Fillmore's position as president of the Senate was, therefore, very difficult. After several months of debate and an apparently complete deadlock, President Taylor suddenly died. Fillmore succeeded to the presidency on 9 July 1850. The Taylor cabinet promptly resigned. A new one was formed with Webster at its head. Clay was now in close touch with the administration, if he did not actually advise and direct its course. There was no longer a question of the peaceable solution of the pending issues. Clay, Webster, Fillmore and the Southern Whigs, aided by the Northern Democrats, arranged for the admission of California, the organization of New Mexico, the payment of the Texan claims, the prohibition of the slave trade in the District of Columbia and the return of fugitive slaves. Although Clay died two years later the popular hero of the compromise struggle, Webster and Fillmore lost standing in the North. When the next Whig convention met, Fillmore endeavored to secure the nomination for the pres-

MILLARD FILLMORE

Thirteenth President of the United States

idency. Webster's friends pressed his claims, but Seward and the irate Northern Whigs would not permit either nomination. The foreign policy of the Fillmore administration was strong and vigorously American, although it was not expansionist like so many others of that period. Fillmore indicated to Europe very plainly that American ideals were still strongly democratic through Webster's famous Hulseman letter in which the government of Austria was told that the people of the United States always sympathized with democratic revolutions, especially with the Hungarian uprising against government imposed from without. There has never been a stronger presentation of the American attitude than that put forth by Fillmore and Webster in 1852. At the close of the administration Fillmore returned to Buffalo where he spent the remainder of his life except two or three prolonged visits to Europe. In 1856 the American or Know Nothing party nominated him for the presidency but he received only a small popular vote and the one electoral vote of a single State, Maryland. He and his supporters in the North, men like Edward Everett and Robert Winthrop, were known as the Silver Grey or Cotton Whigs. But when President-elect Lincoln passed through Buffalo on his way to Washington in 1861 Fillmore was chosen to greet him on behalf of the city. Nor was there ever any question of his loyalty to the cause of the Union. There is no good life of Fillmore, although a great many of his papers have been published in volumes X and XI of the Buffalo Historical Society publications. Consult also Rhodes, J. F., ‹History of the United States› (Vol. I), and Bancroft, Frederic, ‹Life of William H. Seward› (Vol. I).

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FILM, a transparent, flexible substance used as a substitute for glass plates for portable photographic work. It consists of a strip of celluloid which is treated with a sensitized coating, the same as is used on plates. (See Photography). The strip is wound on rollers and so placed in the camera that it may be unwound from one roller, exposed, and rolled on another. The ordinary photographic film is made from liquid cellulose, formed by dissolving gun-cotton in amylacetate or other solvent. It can be made in any length desired by stripping the liquid from polished surface by a revolving wheel. The introduction of the photo-picture gave a great impetus to the manufacture of photographic films; and much experimenting had been done in 1917 with a view to producing a non-inflammable film. Though the object had not been attained the quality of the films produced had been improved.

FILMER, Sir **Robert,** English political writer of the Caroline age: d. 1653. He was educated at Trinity College, Cambridge, and became an active Royalist. He wrote in advocacy of the divine right of kings and was knighted by Charles I. His uncompromising defense of absolutism made him a marked man and his views were strongly controverted by Algernon Sidney and Locke. Undoubtedly his most important work is ‹Patriarcha; or the Natural Power of Kings› (1680).

FILMY FERNS. See Ferns and Fern Allies, *Filicales* (7).

FILON, fē-lôṅ, **Auguste,** French historian: b. Paris, France, 7 June 1800; d. there, 1 Dec. 1875. A commanding point of view and alluring style are conspicuous throughout his ‹Comparative History of France and England› (1832); ‹The Spiritual Power in its Relations with the State› (1844); ‹History of the Roman Senate› (1850); History of the Athenian Democracy› (1854); and several other important historical works.

FILON, Pierre Marie Augustin, French critic: b. 1841. He is the son of A. Filon (q.v.), and was tutor of the Prince Imperial 1867–70. He is the author of ‹Guy Paton› (1862); ‹Les mariages de Londres› (1875); ‹Histoire de la littérature anglaise› (1883); ‹Prosper Mérimée› (1894); ‹English Profiles›; ‹Le Théâtre anglais› (1896): ‹De Dumas à Rostand› (1898); ‹La caricature en Angleterre› (1902).

FILTER and FILTRATION. In chemical technology the process of filtration consists in passing a liquid through a porous or fibrous body such as paper, cloth, felt, or biscuit pottery, for the purpose of removing certain solid substances from the liquid. In chemical analysis in the wet way, filtration is resorted to continually, in order to separate precipitates from the liquids in which they are floating. The filters used for this purpose consist of sheets of a special kind of bibulous paper, which consist of almost absolutely pure cellulose, so that it will leave practically no ash when burned. The precipitate, when it has all been deposited upon the filter paper, and has been thoroughly washed, is transferred, together with the paper, to a platinum crucible, in which it is heated until the paper has become entirely burned away, and nothing is left but the precipitate that is to be weighed. Gelatinous precipitates filter very slowly, and for this reason it is usual for chemists to pay careful attention to such little details of manipulation as tend to cause the precipitate to take as granular a form as possible, so that the filtration may be performed rapidly. When the object of the filtration is merely to remove solid particles that are suspended in a liquid, and it is the liquid and not the solids which is important, other materials than paper are often used as filtering media with advantage. Thus the liquid may be passed through plugs of asbestos fibres, or of glass wool, these particular substances being very useful when the liquid to be filtered is of a corrosive nature, like a strong mineral acid. Filter «stones» are in common use in chemical factories. These are of pottery make, the clay being mixed with sawdust or cork filings. When the stones are «fired» these combustible substances are burned away leaving large porosities. Filtration through porous plugs is often hastened by creating a partial vacuum on that side of the plug toward which it is desired that the liquid shall flow, and aspirators, or special filter suction pumps, are constructed for this purpose. Filtration is also carried on under pressure, the filter being placed in a pressure box, and the liquid fed to it from a height corresponding to the pressure desired. This idea is utilized on a large scale in the filter press, which is a series of many individual filters, exposing a very large area of filtering material at once in a small space. Rapid filtration is also accomplished by centrifugal motion, the revolving drum being lined with paper or cloth, as may be needed. When it is desired to remove such minute bodies as bacteria from a liquid in which they are suspended, it is common to pass the liquid through a solid septum of unglazed porcelain, though it has been found that nearly all such bodies can be removed by filtration through a sufficiently thick mass of sand. Cities which must obtain their drinking water from rivers polluted by sewage from other towns and cities are now supplied with water of very good quality by filtering the river water through beds of sand several feet in thickness, and statistics, in such cases, have shown that the installation of such filtration plants is often attended by a remarkable decrease in the death rate from typhoid fever and other diseases the germs of which may be conveyed by drinking water. See WATER SUPPLY.

FILTER PRESSES, a combination of a filter or filters with a press. Their purpose is to hasten the process of filtration. The force is applied by hand, steam, electric or water power according to the design, size and capacity of the press. Cheese and cider presses are in reality forms of filter presses. Compressed air is used to operate presses dealing with matter containing a high percentage of water.

FILUM AQUÆ. See RIPARIAN RIGHTS.

FIMBRIA, Gaius Flavius, Roman soldier: d. 84 B.C. In 86 B.C. he was sent as legate to L. Valerius Flaccus in Asia but quarreled with his chief soon after his arrival, and in the latter's absence caused a revolt among the army and killed Flaccus in Nicomedia. Fimbria now placed himself at the head of the army and led it against Mithridates against whom he obtained several successes, shutting him up in Pitane. Fimbria was a violent partisan of Marius and treated with great severity all who sided with Sulla or resisted Roman arms. He gained admission to Ilium by ruse, massacred the citizens and burned the town. Sulla crossed to Asia in 84 B.C., made peace with Mithridates, and then led a campaign against Fimbria, who, seeing himself hemmed in, committed suicide. See MARIUS; SULLA.

FIMBRIATED, in heraldry, a term applied to an ordinary with a border of different hue.

FIN DE SIECLE, făṅ dē si-ā'kl («the end of the century»), supposed to particularly mark the close of the 19th century, regarded as a period of emancipation from the traditional moral and social state of disorder.

FINALE, fē-nạ'lē («end»), in music, the concluding movement in instrumental compositions such as concertos, sonatos, or symphonies, and in dramatic music the piece which ends each act. In the former it is usually lively, but in the latter it depends on the nature of the opera.

FINALE NELL' EMILIA, nĕl'lā-mē'ly'a, Italy, a city of Modena, 25 miles northeast of the city of that name, and on the Panaro River. Silk manufacturing is the chief industry. There is a considerable trade in cattle and agricultural products. Pop. 13,422.

FINANCIAL PROBLEMS OF THE WORLD WAR. The financial problems created by the war naturally divide themselves into four classes, each of which has to be dealt with in the light of the immediate circumstances under which the problems arose. The problems which were believed, before the war began, to be inevitable in case such a war should occur, make up the first of these four classes. The problems which actually arose for instantaneous solution, and in extremely urgent form, at the moment when the war broke out, come second; they differed in many respects from what had been predicted. Into the third class fall the practical problems which arose from time to time as the actual task for providing for the financial needs of war developed. These problems to a greater or lesser extent changed their shape as the war continued, and were dependent, both in their origin and in their character, on the actual events of the war itself. Finally there come up for consideration the problems, financial and economic as well as social and political, which will confront practically the whole world on return of peace.

The question, what problems would have to be met in case of war between the first class European Powers, had been seriously considered and carefully discussed in financial circles during a generation before 1914. So far as they had been outlined, the main questions which suggested themselves were those which would affect international commerce, international exchange and the home and international money markets. It seemed probable in advance that such a war would be fought very largely on the sea, with the navy of each belligerent power destroying the merchant ships of its antagonists, and that this would largely destroy international commerce until one side or the other, as a result of protracted sea fights — a process which occupied a considerable series of years in the Napoleonic wars — should have destroyed the enemy fleet and gained control of the ocean.

It appeared to be inevitable that bankruptcies on a portentous scale would occur in every country engaged in international finance (notably England) as a result of inability by banking houses to collect their immense mass of foreign credits while their home liabilities were coming to maturity. This of itself, it was imagined beforehand, would make the financing of war on a modern scale a task of supreme difficulty; in addition to which, the cost of such a war under modern conditions would be beyond the powers even of a solvent money market to sustain for any great length of time. Recourse to fiat money, on a scale never witnessed in previous history, appeared therefore to be an inevitable consequence. One of the corollaries from this argument was that neutral countries, dependent in a financial and economic way on such belligerent countries as England, France or Germany, would be financially ruined, not only by the shutting off of supplies to which they were accustomed, but by the sudden recall of capital from them by the belligerent markets. Actually, experience proved that these expectations were in each case to a certain extent and in some form realized, but not in the least to the degree which had been anticipated.

When the war actually did break out, the problem of international trade was settled almost immediately by the refusal of the German navy to fight, and by the consequent complete control of the seas by the British navy, after a few German raiders had been captured or destroyed. The problem of international exchange, however, of the assets and liabilities of concerns doing an international business, became at once a most formidable problem for all financial markets. It was especially so at London, whose investments in bills of exchange payable by enemy bankers and merchants were of immense magnitude; but it also affected every other market doing an international business.

The stock exchanges were instantly and very powerfully affected; first because, so long as any stock exchange dealing in the securities of foreign countries remained freely open for business, it would be possible for the enemy or his agents to sell on that market stocks held by them, and to convert them into money; but, second, because merchants and bankers, confronted with loss of the funds due them on foreign account, would be driven to realize in their own stock markets on their own holdings of negotiable securities. The whole complicated structure of finance was threatened with collapse as a consequence, and the problem called for instantaneous solution.

The solution consisted first in the adoption of a "moratorium" on payment of debts. In countries affected by these conditions payment of certain maturing obligations was by law deferred to a future date. Next, notably in the case of England, the matter was dealt with through the assumption by the National Bank of non-collectible foreign bills of international bankers, the government pledging its own credit to support the bank in the matter. The moratorium on debts lasted in most cases only during a few months. The assumption of non-collectible bills of exchange continued throughout the war.

In addition to these expedients, and indeed in advance of them, the London Stock Exchange was closed down. Further liquidation of securities, whether by home or foreign holders, and further demoralization of prices were thereby prevented, and this was followed by similar action on the part of all other stock exchanges in the world, whether located at belligerent or neutral centres. That action provided a temporary solution of one problem of the neutrals; for there had been apprehension, not only of enemy markets selling securities on stock exchanges of belligerents, but of belligerents selling on neutral stock exchanges. But the direct recall of capital in the form of bank credits from neutral markets became at once an extremely disquieting problem. The first result, in the case especially of the United States, was an export of gold, even before the declaration of war, which threatened to exhaust New York bank reserves.

Then, while control of the seas for a week or so was in doubt and gold could consequently not be shipped, exchange rates of the neutral markets on Europe — especially New York exchange — rose to quite unprecedented heights, measuring the urgency of demand for remittance of capital to belligerent markets. When the ocean highway was available again, practically all neutral markets established a moratorium on payments for their own account. The United States was the conspicuous exception. There was only a brief period of hestitation, after which the bankers of this country united to provide all the gold which should be required to meet the markets and maturing foreign obligations.

There remained for solution in the belligerent states the problem of money hoarding and of disappearance of currency. This was instantly met by issues of paper money, sometimes (as in England) under government auspices, sometimes (as in Germany) through so-called "loan bureaus," to whose notes the government gave the right to circulate as money.

These various drastic measures were of a purely protective character. They met, as they were designed to meet, the problems which were instantaneously created by the outbreak of the war and the breakdown of international finance. All markets, after passing with these emergency safeguards through the period of immediate panic, regained a certain stability; in virtue of which they proceeded, in due course, to deal with the equally grave problems which arose as the economic situation and the governmental requirements for war on its present scale unfolded themselves. The problems which then arose — some of them at once, others not until after two or three years of exhausting economic strain — had to do in the main with the following considerations.

How was the money to be raised to pay the expenses of war on the present enormous scale? How were the currencies of the various states to be managed in order to maintain the circulating medium, to prevent the exhaustion of gold supplies, and at the same time to facilitate financial operations of such magnitude as were foreshadowed? What would be the result, whether on ordinary trade or on the prices of materials, of governmental requisitions from productive industry for war purposes; requisitions which presently rose to an almost unbelievable magnitude? What would happen to the transportation industry and its usual customers, on land or on sea, when governments were using the railways to move troops and military supplies, and were seizing merchant ships to act as naval convoys? Finally, how would the world be provided with food, when some of the most populous states were dependent on imports from foreign producing countries, and yet when some of the largest grain producers, such as Russia, were shut off from other markets through the enemy's blockade, when the supply of farm labor in every belligerent state was depleted by military conscription, and when some of the most fertile districts of continental Europe were being devastated by the hostile armies?

These questions, though by no means comprising the whole of the difficulties created by the war, may be taken as fairly summing up the main problems which arose in the course of the war itself, and as a result of the steadily increasing absorption of financial, physical and industrial energies in providing means for prosecuting the war. In meeting the war expenditure, all of the belligerent nations relied on loans to an extent wholly unprecedented in history. Prior to this war the largest loan ever raised in a single and limited subscription period was the $300,000,000 British government loan in the second year of the Boer War in 1901. In February 1917 England placed a loan of $4,900,000,000, and the United States in the autumn of 1918 opened subscriptions for the $6,000,000,000 loan to be taken within three weeks.

It was roughly estimated toward the end of 1918 that the total governmental indebtedness of all belligerent states, which had been $27,000,000,000 in 1914, had risen to $180,000,000,000. These enormous requisitions were partly facilitated through virtual prohibition by governments of any other issues of new securities in their markets. Since as much as $1,300,000,000 had been thus invested in all sorts of miscellaneous securities at London during a single year in the period before the war, this conservation of investment capital naturally helped. But when the war expenditure subsequently got as high as $12,480,000,000 in England for the fiscal year ending 31 March 1918, with $24,000,000,000 planned for the fiscal year 1919 in the United States, other resources had to be discovered.

Some nations, notably France and Russia, borrowed heavily from the national banks on security of new government obligations; the Bank of France reporting at one time $4,000,000,000 in loans thus outstanding to the government. But in the main, the loan flotations were effected through the immense number of individual subscribers who drew to the extent of their ability on their own accruing income and other accumulated savings. In the first American war loan 4,000,000 separate subscriptions were received; in the second loan, 9,400,000; in the third, 18,308,000.

In cases where certain governments were unable to raise the necessary loans, or where their purchases of war material in foreign countries made payment through exchange a practical difficulty, advances were made by one belligerent government to its own allies on a scale never imagined in the period of «Pitt's subsidies.» Such advances by the English and United States governments had by the autumn of 1918 exceeded $7,000,000,000 apiece. Along with the raising of loans came a wholly unprecedented increase in taxes; the United States raising one-third of its war costs in that way; England something like 16 per cent of them. Even Germany, after endeavoring during the first year or two of war to finance its whole war expenditure through loans, was driven to a similarly rapid increase in the taxes.

The paper currencies of the belligerent states were enormously increased. In France, largely through issue of notes against new government obligations, outstanding circulation increased from $1,330,000,000 at the beginning of the war to $6,000,000,000 in 1918. That of the Bank of Russia rose from $1,160,000,000 on 30 July 1914 to $9,100,000,000 at the time of the Bolshevik revolution in the autumn of 1917. How much was issued under the Bolsheviki is a matter of pure conjecture.

The Imperial Bank of Germany's note issues increased from $470,000,000 in 1914 to $3,200,000,000 in the middle of 1918, and in addition, the German loan bureaus established for the war issued $2,500,000,000 of their own notes. In England a special issue of paper money through the banks, known as «currency notes,» reached in the autumn of 1918 a total of $1,358,000,000. In the case of England, a gold reserve was maintained against these notes, though the total amount of that reserve did not change after 1915, and the Bank of England continued to issue its notes only against an equivalent reserve of gold. Gold payments were suspended entirely by belligerent states on the European continent. But both Germany and France made special appeals to their people in 1915 to turn over gold to the government in exchange for notes; with the remarkable result of adding some $250,000,000 to the gold reserves in the hands of each nation.

In all belligerent countries, the problem of the rise in prices for materials was met through establishment of maximum prices by the government; this policy being strenuously applied in the case of materials bought by government for war purposes, and in the case of food. Generally, these prices were adjusted somewhere near the figures reached through the rise of nearly 100 per cent in average prices on the markets during the early years of war. They were designed primarily to prevent further speculative advance in prices and to obstruct the withholding of products by the producers themselves with a view to a higher price.

Even in the United States, maximum prices thus established for wheat and steel, for instance, were higher than any prices reached in those markets for any length of time between the Civil War period and the outbreak of this war. Along with this fixing of maximum prices, all belligerent nations and many of the neutrals adopted systems of restricting the distribution of supplies of such materials. This policy was adopted most stringently in the case of fuel; the general view being that the government's needs must first be absolutely ensured, and that thereafter the needs of private consumers should be equitably adjusted.

The transportation problem early became acute. Railways in continental Europe were already controlled by the state. In England such control was assumed within two months of the outbreak of hostilities, and the United States government took similar action regarding the American railways in December 1917, eight months after its own entry into the war. In both the United States and England this public control was based on a system of compensation whereby earnings of the railways during the three-year period preceding the war were guaranteed by the government. The British government did not explicitly commit itself to the return of railways to their owners after the war. The Railway Control bill passed in the United States Congress provided for such return 18 months after the proclamation of peace.

As for ocean transportation, it became necessary, particularly during the later years of the war, for belligerent governments with access to the sea to apply restrictions on essential and non-essential export and import of freight. This necessity arose not only because of the extensive use of existing shipping facilities for transportation of government material, but more especially because of the actual shortage of such facilities, after the wholesale destruction of Allied merchant vessels by German submarines had begun.

Regulation of exports to neutral countries from England began early in the war, being then based on the program for blockading Germany, and having as its immediate purpose the preventing of reshipment, through the neutral countries into Germany, of supplies acquired from England. After its own entry into the war the United States pursued a similar policy, which by that time had the further justification of the shortage both of supplies and of ship room. In the meantime, both England and the United States devoted themselves to construction of new merchant ships on a scale never witnessed in the history of the shipping industry.

The problem of food proved to be one of the most difficult of all. It became acute in 1917 and the early part of 1918; its less aggravated form in the earlier years of war being due to special reasons. In the two years mentioned, not only had wheat harvests of the largest producing countries turned out deficient, but shortage of ships had made it impracticable to transport wheat from distant producers like Australia to the European market. In some countries, Germany in particular, actual rationing of the supply of flour and bread was adopted by the government. In all belligerent countries the situation was met by the required use of substitutes for wheat, and by compulsory observance of certain days on which wheat should not be sold or eaten. Similar restrictions were subsequently applied to consumption of meat, sugar and other foodstuffs. In both England and the United States, and by all other producing belligerents, distribution of foodstuffs from producer to market was placed in the hands of a government commission.

These expedients, especially the reduction in consumption through the restrictive regulations, served to meet the emergency. In 1914 and 1915 the United States had raised grain harvests far beyond any precedent in its history; it was this which postponed until later in the war any actual «food crisis» of the Entente Allies. But the American wheat harvests of 1916 and 1917 were not only 30 to 40 per cent below the yield of the two previous years, but were actually below the average of recent years preceding them, and it was not until the raising of another American wheat crop in 1918, second in magnitude only to that of 1915, that the strain relaxed. Meantime, however, and despite the maximum price fixed for wheat, most urgent efforts were made to stimulate the planting of new wheat acreage by farmers in every wheat producing country. The result of this propaganda was seen in the autumn of 1918, when England's acreage under grain, and its average yield of crops, were the largest in 40 years, and when the results in Continental countries, except in the actual area of warfare, were better than in any preceding season since the first year of the war.

The economic and financial problems which will arise on conclusion of the war, and as a result of the war, belong in a class apart. To attempt to foreshadow in advance their nature and the probable solution of them would be as futile as the predictions regarding war-time problems, made before 1914, have already turned out to be. It is probable, indeed, that some *post-bellum* problems will arise which could not have been foreseen at all beforehand. Experience of the war itself has, however, converged interest and discussion on the following definite problems as certain to arise in that period:

(1) Management of the enormous war debts of the belligerent governments — a question which involves the possibility of repudiation in some countries; in others the possibility of a «levy on private capital» heavy enough to pay off all or a good part of the principal of the debt. Interest on the war debt in one or two belligerent countries already equals the entire public revenue of such countries in the year before the war.

(2) Reduction of the paper currency where excessive inflation has prevailed, and resumption of gold payments; reforms which have always been slow and difficult of achievement in the past.

(3) Readjustment of prices, in cases where such prices have been raised to abnormal heights through the war demands of government on products of a given industry or (as in grain) through the cutting-off of previous large sources of supply by the war itself.

(4) Readjustment of the wages of labor, where those wages have been abnormally advanced through demand for workers in new war industries or through curtailment of the labor supply by army conscription. If wages are not adjusted, then the problem of industry's adjustment to such a scale of wages under peace-time conditions will remain. This whole question will naturally be affected by the resumption or prohibition of emigration from one country to another, and by the extent to which the industrial employment of women in war-time, to replace men, turns out to have been temporary or permanent.

(5) Problems peculiar to international trade, when some of the largest exporting states of the period before the war have been partly or entirely cut off from their previous export market, and when neutral states, or partial belligerents like Japan, have largely assumed the task of supplying the important countries. The question of after-war competition between different exporting markets, which will itself have to do with the question of labor and wages in the different countries, is connected with this.

(6) The largest problem of all; the extent to which, in control of railways, telegraphs and other enterprises in regulation of prices, production, distribution and consumption, and in actual ownership of facilities, governments will retain after the war the immensely increased powers necessarily granted to them during the period of war.

ALEXANDER D. NOYES,
Financial Editor, New York Evening Post.

FINBACK, a whalebone whale of the genus *Balænoptera*, having the dorsal fin, which in most whales is small or altogether wanting, well-developed. This genus is widely distributed and contains a number of species, which include the largest cetaceans known. The special finback or «finner» of the eastern coast of the United States (*B. musculus*) is from 30 to 70 feet in length. Other species are described elsewhere, as Sibbald's whale, sulphur-bottom, etc. Despite their huge size, finbacks yield so little oil, and such inferior quality of whalebone that they are little sought for.

FINCH, Francis Miles, American poet and jurist: b. Ithaca, N. Y., 9 June 1827; d. there, 31 July 1907. He was graduated at Yale; and wrote the well-known lyrics ‘Nathan Hale’ and ‘The Blue and the Gray,’ and a popular college song beginning ‘Floating away like the fountain's spray.’

FINCH, Heneage, 1st Earl of Aylesford: b. about 1647; d. 1719. He was the second son of Heneage Finch, first Earl of Nottingham. Educated at Christ Church, Oxford, he was admitted as a barrister of the Inner Temple. He soon became known as the author of various reports of celebrated trials and other legal tracts. He was appointed king's counsel in 1677, solicitor-general in 1679, and entered Parliament as member for the University of Oxford in the same year. He was deprived of his solicitor-generalship by James II, and two years later pleaded as leading counsel on the side of the seven bishops. He represented Guildford in Parliament in 1685, the University of Oxford in the Convention Parliament of 1689–90, and in all subsequent ones until his promotion to the peerage in 1703, as Baron Guernsey, when he became a member of the privy council. On the accession of George I he became Earl of Aylesford, and chancellor of the Duchy of Lancaster, which office he resigned in 1716. Consult Burnet, ‘History of His Own Time’ (ed. 1823, Vol. II, pp. 106, 397); Collins, ‘Peerage’ (ed. 1779, Vol. IV, p. 316).

FINCH, William Albert, American lawyer and author: b. Newark, N. J., 1855; d. 1912. In 1880 he was graduated at Cornell University and in the same year entered on the practice of law at Ithaca, N. Y. From 1891 to 1912 he held the professorship of law at Cornell University. He was widely recognized as an expert in the law of real property. He published ‘Finch's Selected Cases on the Law of Property and Land,’ and ‘The Law of Property and Land — A Syllabus.’

FINCH, one of the small, seed-eating birds, typical of the family *Fringillidæ* (q.v.). The term as now commonly used refers to the smaller, more ornately dressed genera and species, and especially to those generally kept as cage-birds, as the canary, chaffinch, goldfinch, hawfinch, greenfinch (qq.v.), and similar well-known kinds of the Old World. In the United States the name is reserved for the American goldfinch and its greenish relative of the north, the pinefinch; for the purple finch (q.v.), the rosy finches of the genus *Leucosticte;* the housefinch (q.v.) of California; and especially for the small gaudily colored southern birds of the genus *Cyanospiza,* represented in the Northern States by the indigo-bird (q.v.). In these little seed-eaters, such as the nonpareil (*C. ciris*), the lazuli finch (*C. amœna*), and the Mexican varied (*C. versicolor*), the plumage of the male abounds in the richest tints of changeable blue and green, varied by other colors in pleasing contrast. All utter sweet and varied notes, and are prized not only as garden visitors but as cage-birds. The name is also commonly given in the northeastern United States to the «grassfinch,» more properly a sparrow (*Poocætes gramineus*), a brown bird which breeds and spends its life in open fields, singing most sweetly at dusk, and easily recognized by the fact that when it takes flight it exhibits a white feather on each side of the tail.

FINCH-FALCON, one of the genus (*Microhierax*) of tiny falcons, or «falconets,» of the East Indies. One, *Microhierax cœrulescens,* is found in the Himalayas and Burmese countries. Not one of these little hawks is seven inches in length; they are said to be used by native chiefs for hawking insects and button quails, being thrown from the hand like a ball. They sit solitary on high trees, and, according to native accounts, feed on small birds and insects.

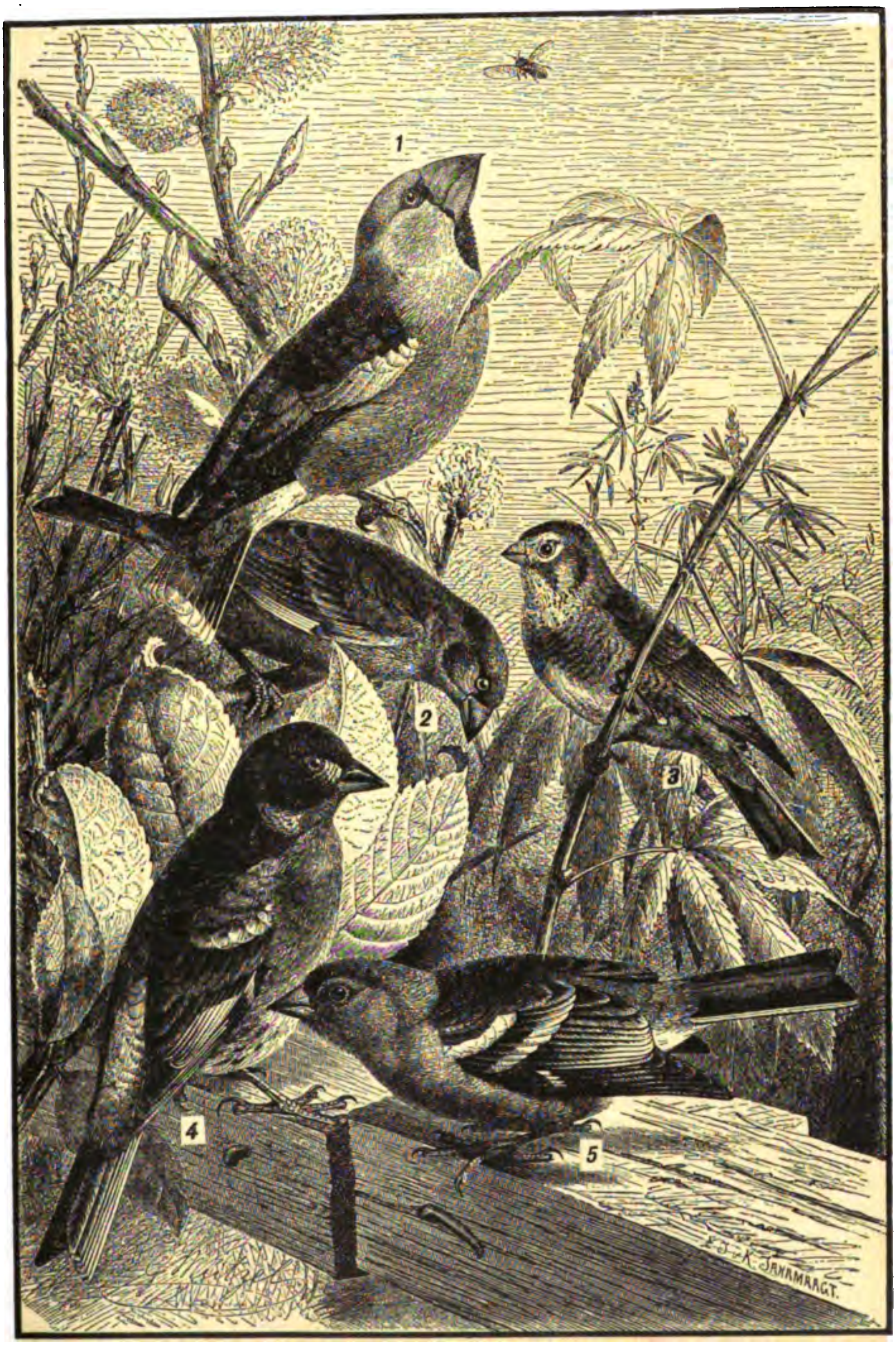
FINCHLEY, England, an urban district of Middlesex, about five miles northwest of London on the Great Northern Railway. It is situated at an elevation of over 300 feet and this has helped to make it popular as a residental district. Finchley Common was formerly the resort of highwaymen, such as Dick Turpin and Jack Sheppard. The Common has not been preserved, its site being now occupied by buildings. The district owns and operates an electric-lighting plant. Pop. 39,419.

FINCK, fink, **Henry Theophilus,** American musical critic: b. Bethel, Mo., 22 Sept. 1854. He was graduated at Harvard in 1876; and from 1878 to 1881 studied physiological psychology at Berlin, Heidelberg and Vienna. In 1876 he attended the Bayreuth Festival, of which he wrote accounts for newspapers and magazines. In 1881 he became musical critic of the New York *Evening Post,* and entered upon his long propaganda for Wagner's music, becoming the leading American advocate of that composer's theories. His works include ‘Wagner and His Works’; ‘Romantic Love and Personal Beauty’ (1887); ‘The Pacific Coast Scenic Tour’ (1890); ‘Chopin, and Other Musical Essays’; ‘Lotos Time in Japan’ (1895); ‘Spain and Morocco’; ‘Paderewski’; ‘Primitive Love’ (1899); ‘Songs and Song Writers’ (1900); ‘Eduard Grieg’ (1905); ‘Massenet and His Operas’ (1910); ‘Henry Strauss; The Man and His Works’ (1917), etc.

FINDLATER, Andrew, English encyclopædist: b. Aberdour, 1810; d. Edinburgh, 1 Jan. 1885. He was educated at the University of Aberdeen, and for a time studied with the view of entering the ministry. In 1853 he entered the publishing house of W. and R. Chambers, Edinburgh, for whom he prepared a revised edition of ‘Information for the People’ (1857). His success in this work caused him to be selected as editor of ‘Chambers' Encyclopædia,’ and the character of this work bears throughout the impress of his directing hand. He contributed to the work several important articles. He was employed on the encyclopædia until 1868, and in 1874 he edited a revised edition. He also edited other works of the same firm and was a regular contributor of the *Scotsman.* He retired in 1877, but remained a consulting editor of the Messrs. Chambers. Aberdeen University conferred on him the degree of LL.D. in 1864.

FINDLAY, George Gillanders, English educator and Biblical scholar: b. 3 Jan. 1849. He was educated at Wesley College, Sheffield,

SONG FINCHES



1 Hawfinch 2 Greenfinch 3 Linnet 4 Chaffinch 5 Mountain Finch

Richmond Theological College, and London University, being graduated at the last named institution in 1867. In 1870–74 he was assistant tutor at Headingley College, from 1874 to 1881 classical tutor at Richmond, and after 1881 tutor of exegesis and classics at Headingley. He retired in 1917. He published several commentaries on Saint Paul's Epistles in the ‘Expositor's Bible,’ ‘The Expositor's Greek Testament,’ etc.; also ‘The Church of Christ in the New Testament’ (1893); ‘Christian Doctrine and Morals’ (1894); ‘The Books of the Prophets and their Historical Succession’ (3 vols., 1896–1907); ‘Sermons on the Things Above’ (1902); ‘Fellowship in the Life Eternal’; ‘An Exposition of the Epistles of Saint John’; ‘Life of William F. Moulton’ (1910); ‘Wesley's World Parish,’ etc.

FINDLAY, Ohio, city and county-seat of Hancock County, Ohio, on the Toledo and Ohio Central, the Lake Erie and Western and other railroads, 44 miles south of Toledo. It is in the heart of the oil and gas fields of Ohio. It contains Findlay College, electric lights, electric railroads, several banks, and numerous daily, weekly and monthly periodicals. Findlay is widely known on account of its phenomenal yield of natural gas. In November 1888 the Tippecanoe gas well was drilled and yielded 31,000,000 cubic feet of gas per day. In the vicinity are rich beds of clay and large deposits of gravel and sand. There are manufactories of glass, pressed bricks, furniture, wooden implements, nails, and an oil refinery, machine shops, foundries, extensive potteries and rolling-mills, and manufactories of automobiles, traction ditchers, electric insulators, gloves, shoes, etc. Settled in 1813, Findlay was first incorporated in 1837. The government, under a charter of 1902, is administered by a mayor, chosen biennially, a city council and members of public safety and service. The waterworks are owned and operated by the municipality. Pop. 14,858.

FINDLAY COLLEGE, a coeducational institution in Findlay, Ohio; founded in 1882 under the auspices of the Church of God; reported at the close of 1915: Professors and instructors, 19; students, 531; volumes in the library, 6,125.

FINE, Henry Burchard, American mathematician: b. Chambersburg, Pa., 14 Sept. 1858. He was graduated at Princeton in 1880 and received the degree of Ph.D. at the University of Leipzig in 1885. Since 1881 he has been connected with the faculty of mathematics of Princeton, successively as tutor 1881–84, assistant professor 1885–90, Dod professor of mathematics since 1891, dean of the faculty 1903–13, and dean of the department of science since 1911. He was president of the American Mathematical Society in 1911–12. He published ‘Euclid's Elements’ (1891); ‘Number System of Algebra’ (2d ed., 1903); ‘College Algebra’ (1904); ‘Coördinate Geometry,’ in collaboration with H. D. Thompson (1909).

FINE (*in criminal law*). In modern usage, a pecuniary penalty imposed by a legal tribunal on an offender as a punishment. The term originated in England about the 13th century, when criminals were allowed to shorten the terms of their imprisonment by paying a designated sum of money into court. From early days in England until recently it had been the usual practice, under the common-law rules, when a prisoner was sentenced to pay a fine, to include in the judgment an order that he be committed to jail until the fine be paid. This practice, either by the rules of the common law or by statutes, subject to constitutional limitations, has been continued in the United States. The maximum amount of fines for specific offenses is usually fixed by statute, but within certain limits it is often discretionary. Frequently a fine is an alternate to a term of imprisonment, at the discretion of the presiding judge. On failure to pay the fine, the prisoner is ordinarily, in most of the jurisdictions in the United States, committed to the penitentiary or the county jail. After payment of the fine, the prisoner is entitled to an immediate discharge. Excessive fines are prohibited by the Eighth Amendment to the Federal Constitution, and whether a fine is excessive or not is a question of law for the court to determine. Various State statutes fixing heavy fines for different offenses have been declared void by the Federal courts of the United States, from time to time, on the ground that such statutes came within the above-named constitutional prohibition. In some States, by statute or by common law, a fine may be enforced by execution against the property of the defendant, but in other States a fine can be enforced only by imprisonment. At common law and in the absence of statutory prohibition, a commitment of an offender until the fine be paid may be for an indefinite period if the fine be not paid, and this has been held not to be in violation of a constitutional provision against indefinite imprisonment. In some States offenders who have been convicted and fined may be compelled to pay it by working on a public improvement or by being hired out to private individuals, on the basis usually of credit at a certain rate per day.

FINE (probably from Latin *finis*, «end»), in English law, formerly signified «an income or a sum of money paid at the entrance of a tenant into his land; a sum paid for the renewal of a lease; and an assurance by matter of record founded on a supposed previously existing right. In every fine which was the compromise of a fictitious suit, and resemble the *transactio* of the Romans, there was a suit supposed, in which the person who was to recover the thing was called the plaintiff conusee or recognizee, and the person who parted with the thing the deforceant, conusor or recognizor. Besides the specific uses above referred to, fine has the signification in general law, in America as well as in Europe, of a pecuniary penalty exacted either in punishment of, or in compensation for, an offense, whether committed against an individual, in contravention of the laws of the community, or against the community itself. Fines in this sense are of very ancient origin, and have been sanctioned by the practice of all nations, ancient and modern, from the lowest to the highest degree of civilization. In the earlier stages of society fines form, for an obvious reason, one of the principal modes of punishment. Prisons and artificial restraints impose a burden on society which it is not yet able to bear, and demand an organization which it has not reached. There remain only fines, corporal chastisements and death. The last is suited only for the gravest offenses; the second is rendered impracticable in the case of many offenses by the dignity of the offenders; the first in many others by their impecuniosity.

In the most civilized nations of antiquity, Greece and Rome, fines were numerous and frequently excessive. In the early period fines were imposed in cattle, the highest amount of the mulcta or damnum being 2 oxen and 30 sheep. The ancient Germans, being a people who highly valued freedom, admitted hardly any punishments but fines, and their influence extended the use of this penalty among other European nations. A murder was commuted by a payment to the family of the deceased. In the ancient French law fines were divided into two classes, according as they were fixed by law or left to the discretion. This distinction has been abolished since the Revolution by the fixing of maximum and minimum limits for all fines. In England the common law recognizes fines, but does not determine their amount, and this is usually fixed in particular statutes, with a discretion to the judge. The rule in England from an early period, and which was incorporated in Magna Charta, was that no man should be amerced beyond his circumstances and personal estate, leaving to the landowner his land, to the merchant his stock and to the husbandman his wainage or team and instruments of husbandry.

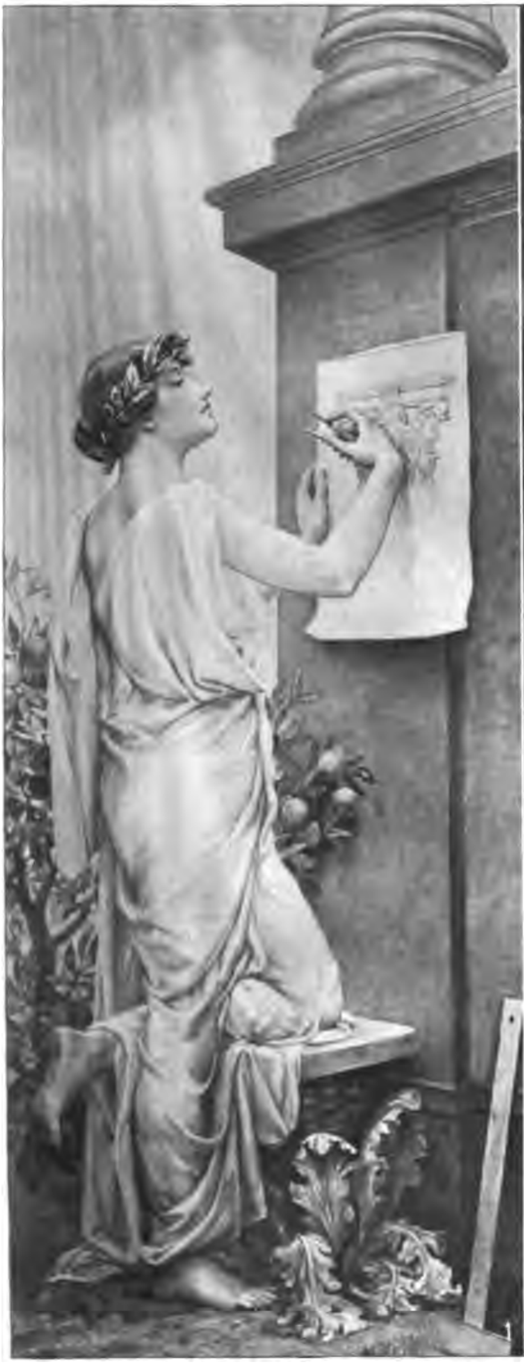
The fine, as distinct from an amercement assessed by a jury, originated in English law as a means of purchasing freedom from a sentence of imprisonment. The alternative of fine or imprisonment is still in common use for the punishment of misdemeanors and imprisonment for a relatively brief period is often adjudged for the non-payment of a fine.

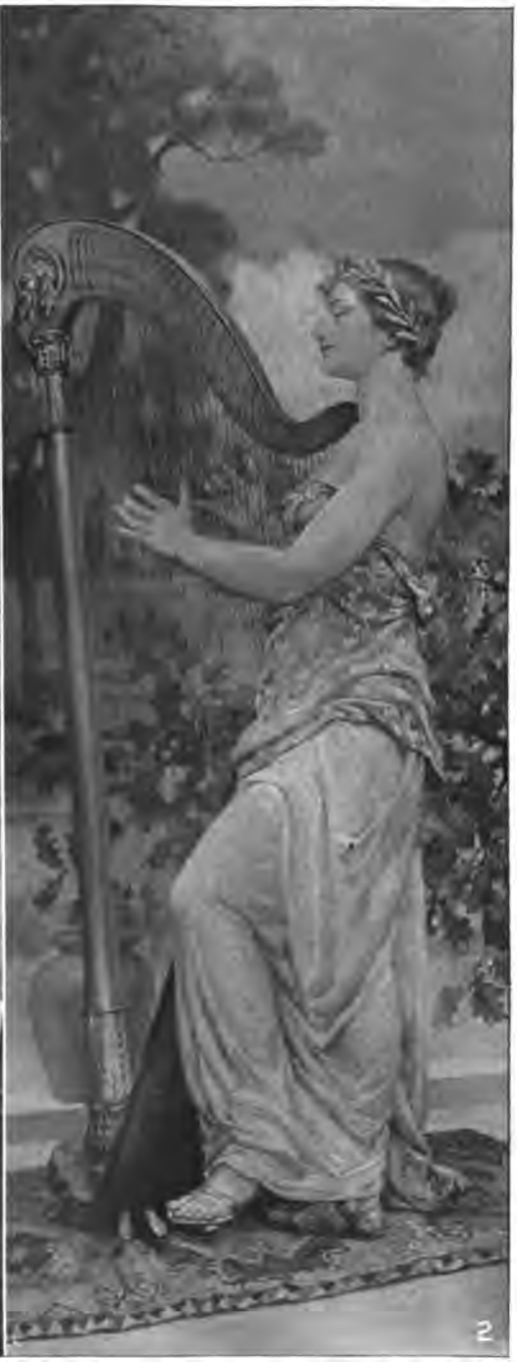
FINE ARTS is the generic term for those arts intended primarily to affect the emotions, such as sculpture, painting, music, etc., as distinguished from the *useful arts* which serve the physical needs of life. Art in general may be defined as the exercise of human activity for the accomplishment of a predetermined end; or more specifically, an exercise of the creative faculty or imagination according to rules determined by experience or laid down by science. (See ART). The useful arts are those whose works are intended to serve some practical end or material need of man — that is, for a purpose external to themselves. The fine arts are, on the other hand, those whose products are created to be contemplated or enjoyed, that is for a purpose *which ends in the works themselves*. A picture is painted for its own sake, not to be used as an instrument of some activity, but to be looked at; the emotions it arouses terminate, as it were, in the picture, which is itself the object of interest: it is a work of fine art. The same is true of a symphony or of a song, of a poem or of a drama, of a statue or of a noble building. Each is a work of fine art; apart from any practical or utilitarian end, each appeals to the æsthetic emotions, and these emotions, thus aroused, constantly direct the attention to the work which called them into action. In this sense the work exists for and by itself. There is a broad field to which we may assign all that large class of works which, although primarily intended for use, are at the same time objects of beauty. All rich and beautiful work in furniture, pottery, metal-work, textile fabrics, bookbindings, vases and the like, upon which the designer and craftsman have bestowed their efforts in order to make them appeal to the sense of beauty in the beholder, are so far works of fine art. There is no distinctive name for these arts which thus combine the character of useful art and fine art. They may be called the *industrial arts,* but this term is quite as often used to designate the useful arts generally, while the classification of the *decorative arts* includes various arts associated with architecture which, since the purpose of their products terminates in themselves, or in the structures of which they are a part, are properly classed among the fine arts: such are mosaic and stained glass. Architecture stands on the borderland of both domains, being the noblest of the useful arts, and yet, in all those elements in which the architect seeks after pure beauty as distinguished from mere utility or fitness, entering into the field of the fine arts, and summoning painting and sculpture to serve it as sister arts. Those, then, of the decorative arts which are applied to the beautifying of useful objects, may properly be called the *industrial decorative arts*. (See INTERIOR DECORATION). Under this classification would be included all decorative weaving, textile work and basketry; decorative metal-work in iron and bronze, silver and gold, etc., applied to the adornment of implements or furniture; decorative woodwork in furniture, including wood inlay; and all decorative pottery and ceramics. When, however, any of these arts is applied to the decoration of permanent or immovable structures instead of movable objects, they become ancillary to architecture, and are often called «the allied arts» or «the accessory arts,» along with mosaic, ornamental carving and stained glass.

Literature as a fine art comprises all those kinds of writing in which beauty of language and of literary form is aimed at, taking on often an importance equal to that of the substance of the writing, as in much lyric poetry. Poetry, eloquence or oratory and the drama, and sometimes fiction, belong in the domain of literary fine art. But inasmuch as all writing is conceived primarily as a means of information and of communicating ideas, and is addressed to the intellect quite as much as to the æsthetic emotions, literature is always classed apart from the other fine arts. See BELLES-LETTRES.

Besides the major fine arts — painting, sculpture, architecture and music — there are certain minor arts which minister to the lower forms of æsthetic pleasure. Dancing belongs in this category, when practised not as a social diversion, but as an artistic sequence of beautiful and rhythmic movements, as in the ancient Greek choral dances, the modern Samoan dances, the operatic ballet, folk-dances and other forms of the art made familiar to us by Russian and American performers. Fireworks are also a form of fine art, having no other purpose than to delight the æsthetic sense by beautiful combinations of luminous form and color. Whether, therefore, a given work belongs among the «pure» or «independent» or «major» fine arts, or the decorative arts, is really a question of how far it has been created for its own sake, and how far its artistic value

FINE ARTS





Rotunda Panels in the State Education Building, Albany, N. Y. Mural Paintings, Copyright by Will H. Low

1 **ARCHITECTURE.** The standing figure, typifying Architecture, with compasses in hand, studies upon a scroll before her the proportions of the Corinthian capital in which order of architecture the Education Building is designed. Her left knee, upraised, rests lightly upon a slab covering a basket, recalling the legend by which Callimachos, an architect of Corinth, having lost his daughter, placed upon her grave a basket containing objects for her journey beyond the Styx, covering it with a tile to preserve it from the weather. On visiting her grave he found an acanthus had grown up around the basket in so graceful a manner that it suggested to him the design of the Corinthian capital

2 **MUSIC.** Standing erect before a harp over which her fingers stray, the figure of Music is shown upon a carpeted terrace, to denote the near proximity of a house, as music is essentially an art of indoors, while, as the most modern manifestation of the arts, as music is now understood, her costume suggests a less classic form than the figures in the other panels

and merit can be dissociated from the object or structure which it embellishes. Thus the sculptures of the Parthenon pediments, although ostensibly created as decorations for a temple, are really of such surpassing merit as works of sculpture, quite apart from their architectural setting, that they are universally recognized as masterpieces of pure sculpture. On the other hand, the charming figures of nymphs of the Seine carved in low relief by Jean Goujon, in the Fountain of the Innocents in Paris, are so evidently designed for the special places they occupy in that structure and lose so much of their value and significance when detached from it, that they are universally recognized as masterpieces of decorative art.

The Appeal of the Fine Arts.— In the appeal which works of fine art make to the emotions there is nearly always a large element more or less purely intellectual, which must be distinguished from the purely æsthetic quality of the work. Thus a picture represents a scene or an episode; a poem tells a story or extols a religious or moral conception; a statue presents the effigy of a hero, or the embodiment in allegorical form of some abstract conception; a song expresses an idea of love, patriotism or war; a building excites admiration by its bold construction and logical planning. Each of these works addresses itself in these particulars rather to the mind than directly to the feelings. In judging them, therefore, purely as works of fine art, we must eliminate the element of purely intellectual satisfaction from our judgment in order to weigh correctly the purely æsthetic excellence of the work. A picture æsthetically beautiful may be uninteresting from the intellectual point of view. Still more often does it happen that a picture appeals powerfully to the reason, and even reaches the emotions through the intellect, and is nevertheless totally lacking in æsthetic excellence, as is often the case with political cartoons and clever caricatures. Its appeal is primarily to the intelligence, and the emotions which are aroused as the final but secondary result are moral and intellectual emotions rather than æsthetic. The appeal of a work of fine art to the æsthetic emotions is the direct appeal of beauty of form or color, harmony, rhythm, balance, proportion, movement. It is often difficult to distinguish between the direct æsthetic effect of a work of art and its indirect appeal through the intellect, but the distinction is important in any close analysis or detailed criticism, and the failure to recognize it is the root of many erroneous judgments and criticisms by writers on art. This error is frequent in Ruskin's writings, for instance, where moral and intellectual appreciations often dominate what are advanced as purely æsthetic judgments. See CRITICISM.

It does not, however, by any means follow that those are the highest forms of art which appeal most exclusively to the æsthetic sense. Dancing and pyrotechny are completely free from intellectual and non-artistic elements, but they can hardly be classed as the highest forms of art. Intellectual satisfaction is a natural accompaniment of the pleasure we experience in many forms of art; and, other things being equal, the higher the form and grade of the work the higher will be the intellectual satisfaction experienced. The artist who can at once touch our deepest emotions and appeal to our highest intelligence while he delights our æsthetic sensibilities, has reached a higher plane of art than one whose work makes no such intellectual impression. And while it is true that any philosophical analysis must make the distinctions above set forth, it is also true that the spectator seldom or never makes them, and is in no wise called upon to do so. The philosophical analysis of art is one thing, the subjective enjoyment of it is another. The total impression it makes is very complex, and not easy to divide into its constituent elements.

Principles and Technic.— The underlying principles of all the fine arts are the same; the application and development of these principles vary with the art, its medium of expression, the purpose of the work, the personality of the artist, the time and place in which he lives and many other circumstances. The particular method of the application and development of the underlying principles in a given form of art constitute its *technic*; the shape and direction imposed upon this technic by external conditions of time and place, and the resulting characteristics or habits and manner of design, constitute its *style*. It is of course impossible to lay down in a brief *exposé* like the present article the laws which are recognized as common to all the arts. We can only observe that they relate to *composition*, which deals with the general plan of the work and the relations of its various parts in that plan or scheme, determining the sequence, balance, proportion and rhythm both of the whole and of its parts; and to *expression* or the manner in which the underlying sentiment, conception or idea of the work is developed and made clear and effective.

Composition.— In every perfect work of art, whether of music, poetry, drama, painting, sculpture or architecture, there should be a fundamental *theme*, a dominant idea or conception which controls the whole, giving coherence and significance to all its parts. The æsthetic conception is to be distinguished from the *subject* of the work, since a noble subject may be made commonplace by inadequate æsthetic treatment, and a commonplace subject exalted by the way it has been handled by a superior artist. In giving form to the underlying conception the artist must secure predominant *unity* of character or spirit, *harmony* in the assemblage and relation of all the parts, and such *variety* in details as to avoid the danger of wearisome monotony and secure that pleasurable æsthetic emotion which comes from changes not too rapid or violent. This variety may, and generally should, introduce the element of *contrast*, but discreetly, so as not to destroy the harmony and general unity of the whole. *Proportion* should be just, giving to each part and to the whole suitable relative amounts and dimensions; and the whole work should possess both *rhythm* and *balance*. Balance is equilibrium between features or groups of features, an equilibrium of size, of intensity of color or tone, of importance or of accent; rhythm is the ordered succession of variations of accent or emphasis. There are those who believe that in all the great works of fine art, «pure» or «decorative,» these qualities have been secured by the application of secret mathematical formulæ, but this contention, despite the ingenuity and learning of its supporters, is not as yet generally accepted by critics and artists.

Expression depends, as has already been said, upon many elements — the sentiment or conception to be expressed, the medium of expression, the technical resources of the art, and the personality of the artist being the chief. Music is peculiarly expressive of moods, of emotions apart from definite mental concepts; poetry of lofty moral and spiritual ideas; painting of the beauty of nature as interpreted through the artist's personality; architecture of sublimity, splendor, grace and elegance revealed in the triumph of mind over matter; sculpture of feeling revealed in the form and attitude of living beings. Each art has its own range and capacity for expressing feelings, emotions and definite ideas which it carries over from the mind of the interpreting artist to that of the spectator or listener, so that expression is always measured by impression. In general, if the inquiry be limited to the strictly æsthetic field, what is expressed is not a categorical idea capable of statement as a proposition, but rather an abstract emotion, sentiment, or quality, as of grandeur, elegance, power, sublimity, grace, pathos or the like. In works of representative art, such as painting and sculpture, fidelity to nature enters largely into this power of expression. This is a different thing from the photographic mimicry of nature which is sometimes admired by undisciplined minds, and which often characterizes the periods of decline in the history of art. This close mimicry is an affair of skilful technic, not of high art. To paint a key hanging on a nail so that the spectator shall mistake it for a real key is clever painting, but not high art. A great painting is one which seizes most completely and conveys through the eyes to the soul most effectively the essential truth, the deep underlying aspects of a scene, subordinating to this end whatever details would interfere with the force and completeness of this impression. These aspects and this impression must first exist in and possess the artist's mind; he can put into his work only what he himself possesses; he must be himself inspired if his work is to be inspiring, for a truly great work cannot be produced by accident, nor by an inferior artist. Great works of art may be marked by flawless technical execution, but this perfection of technic is not essential to their greatness. It is, indeed, oftener found in decadent art than in the periods of greatest inspiration; for it is when inspiration flags that technical finish begins to be exalted into the place of first importance.

Style.— However various the moods, emotions and conceptions of artists of different races and ages, and however manifold the forms in which they are expressed, the men of any one land or period are in general so conditioned by like circumstances and environment, by similarity of customs, traditions and education, ideals and aspirations, and even by popular taste and fashion, that they are unconsciously constrained into certain similarities of subject and manner by which the art of their time and place is clearly distinguishable from that of any other. The resulting predominant manner, form of expression, quality and habit of design we call the *style* of that age and place. The most daringly original artist cannot wholly escape the influence of his environment and education, and those who succeed most completely in disregarding these influences are so few in number that they rarely affect the general set of the art-currents of their day, though they may sometimes prove to be the heralds of new ideas and methods — that is, of a new style — which comes into recognizable existence at a later date. Styles are therefore not mere fashions, nor can they be created or abolished. They are growths, the natural characteristic interpretation of the spirit of the age. The fine arts are therefore rightly studied as the true exponents of the civilizations which produced them. Greek art differs from Roman art as Greek civilization differed from that of Rome. Gothic art differs from that of the Renaissance; French from American art; the art of the end of the 19th century from that of its beginning. The phenomena of style are true of all the arts — of literature and poetry as unmistakably as of music and sculpture, of painting and architecture. It is, however, in the last-named art that styles are most clearly distinguished, not only because of the definiteness and permanence of its forms, but also and chiefly because architecture touches the daily life and habits of a people at more points than any other art, and deals with materials and technical processes which of necessity vary widely in different lands and ages. See ARCHITECTURE.

History.—A history of the fine arts is really a history of the rise, growth, decay and succession of styles in the various arts, with special mention of those masterpieces which embody in the highest degree the qualities and characteristics of those styles, or which mark the various stages of their development. It is manifestly impossible within the limits of this article even to sketch in outline the historic developments of the several fine arts; for this, the reader is referred to the histories of art mentioned in the bibliography at the close of this article, and to the briefer notices in this encyclopedia under the several titles: ARCHITECTURE; DANCING; DRAMA; INTERIOR DECORATION; MURAL DECORATION; MUSIC; PAINTING; POETRY; SCULPTURE.

Bibliography.— The bibliography of the Fine Arts is enormous. The inquirer is referred to the lists of books under the above titles, and under ÆSTHETICS. and CRITICISM.

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FINETTA, a fairy tale by La Comtesse I'Aulnoy, published in 1682. It is merely a version of the story of Cinderella very thinly disguised.

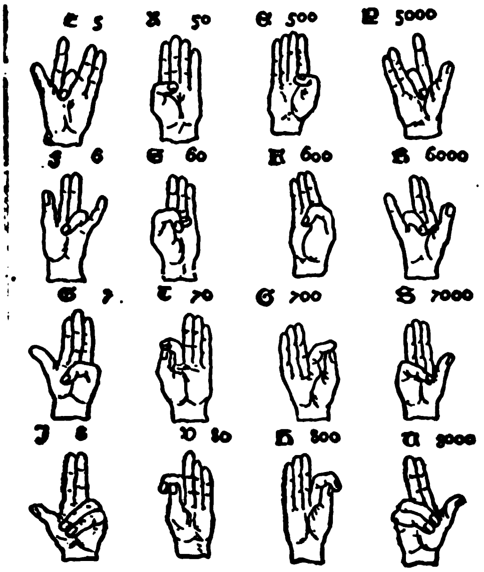
FINFOOT, one of the extraordinary tropical birds of the family *Heliornithidæ*, now considered near allies of the rails, so called on account of the broad scalloped webs along each toe. The best known one is *Heliornis fulica* of northeastern South America, which is about 13 inches long and mainly brown, with a white throat, red bill and feet banded with yellow and black. Other larger species belong to Africa and the Malayan Peninsula. These birds which frequent the swamps or rocky streams of inland woods, fly heavily and push themselves out of the water with their feet.

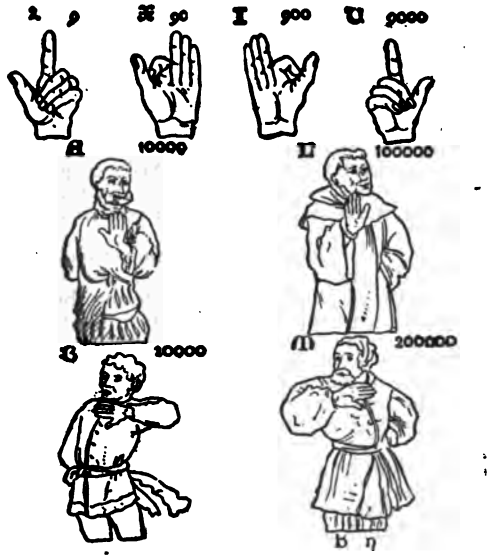
They swim and dive well and run swiftly on land.

FINGAL, fing-gal, a once popular epic by James Macpherson, which appeared in 1762. The poet being a favorite, 'Fingal' had an immense sale. The subject of the epic is the invasion of Ireland by Swaran, king of Lochlin, Denmark, during the reign of Cormac II, and its deliverance by the aid of the father of Ossian, King Fingal of Morven, on the northwest coast of Scotland. The poem opens with the overthrow of Cathullin, general of the Irish forces, and concludes with the return of Swaran to his own land. See OSSIAN; MACPHERSON, JAMES.

FINGAL'S CAVE, a curious cavern formed of basaltic columns, in the Isle of Staffa, one of the Hebrides, on the west coast of Scotland, 25 miles from Oban. See STAFFA and COLUMNAR JOINTING.

FINGER. See HAND.





FINGER-GRASS, a crab grass (*Panicum sanguinale*, Linn.), a well-known annual, common in nearly all parts of the United States, growing in cultivated fields and about dwellings. It is a weed in gardens and among hoed crops. In grain fields after harvest it frequently springs up in such quantity, particularly in the Southern States, as to yield one or even two good cuttings of hay. This spontaneous growth affords excellent pasturage, as well as hay of first quality if properly cured. The stems are much branched and in good soil attain a length of three to four feet. This grass contains little fibre and dries quickly when cut, but if after cutting it is wet by rains or heavy dews its value for hay is almost wholly destroyed.

FINGER NOTATION, a method of representing numbers by the position of the fingers or hands, analogous to the digital language of deaf-mutes. The system is an ancient one and has had three distinct ramifications: (1) The obsolete one of mere numerical representation, to retain the numbers erased during operations on the sand abacus, and probably on the other forms as well (see ABACUS); (2) the one leading to a kind of international language, helpful in bargaining at the great fairs of antiquity and the Middle Ages and still used in the East; (3) that of actual computation, the so-called finger reckoning, still somewhat used in certain parts of the world. Of these three the first was the most important and with the second it resulted in a number language quite as international as the Hindu-Arabic numerals (see NUMERALS) which led to its decay. The antiquity of the system in Egypt, Greece and Rome is attested by several classical writers, Juvenal, for example, speaking of the aged Nestor as numbering his years upon his right hand, that being the one used for numerals exceeding 99. Herodotus, Pliny, Macrobius, Plautus, Seneca, Suetonius, and probably Aristophanes and Solomon (Proverbs iii, 16) are among the other witnesses to its use among the common people in ancient times. In the early centuries of the Christian era it was well known, for it is mentioned by Tertullian (c. 200 A.D.), Saint Ambrose (c. 375 A.D.), and Saint Augustine (c. 400 A.D.). To the Venerable Bede, however, we are indebted for our most definite knowledge of the mediæval system in the West, and to his treatise, 'De loquela per gestum digitorum,' in his 'Opera omnia,' (Paris 1862, tomus I, p. 689), the student should refer for the best description extant. The same notation, not so fully explained, appears in a work written about 800 A.D., although assigned to Cyril of Alexandria ('Liber de computo S. Cyrilli Alexandrini,' published by L. A. Muratori in his 'Anecdota,' Napoli 1776), and in one by Rudulph of Laon, c. 1100 A.D. (Consult 'Abhandlungen zur Geschichte der Mathematik,' Bd. V, p. 91). The international character of the system is further evident from two poems, one in Arabic (Marre, 'Manière de compter des anciens avec les doigts des mains, d' après un petit poème inédit arabe de Chems-Eddin el Mossouli,' in the Boncompagni 'Bulletino,' t. I, p. 309), and the other in Hebrew, by Samuel ibn Abbas (Steinschneider, 'Die Mathematik bei den Juden,' in the 'Bibliotheca Mathematica,' Ser. II, Vol. X, p. 81), and from a description by Nicholas Rhabdas of Smyrna. In his 'Epistles on Arithmetic,' written about 1341, Rhabdas gives the digital notation as it had probably been used in Asia Minor for many centuries, and, aside from Bede's description, this is our best source of information. For a brief digest consult Gow, 'History of Greek Mathematics' (Cambridge 1884, p. 24). For the Greek text, with French translation by Tannery, consult 'Notices et extraits des manuscrits de la Bibliothèque nationale,' (t. 32, p. 147, Paris 1886). The system had not yet died out in Europe when printing was invented and Paciuolo sets it forth in a page of illustrations in the first great modern treatise on mathematics ('Sūma de Arithmetica Geometria Proportioni & Proportionalita' . . . vinegia . . . M.cccc.lxliiij, fol. 36, v.). Several arithmeticians of the 16th century gave descriptions of the method, including Recorde (q.v.), the author of the first arithmetic printed in English. The accompanying illustration is from the most elaborate treatise on the subject, that of Aventinus ('Abacvs at qve vetvssissima vetervm latinorum per digitos manusq numerandi (quin etaim loquendi) cosuetudo, Ex beda cu picturis et imaginabus . . . Ratispone . . . 1532), a work enough esteemed to warrant an edition as late as 1710.

The most common form of finger reckoning was that involving multiplication, the factors being between 5 and 10, thus rendering the table beyond 5 × 10 superfluous. This form is very old and is not yet obsolete. For example, to multiply 9 by 8, think: 5 and 4 are 9 (raising 4 fingers on one hand); 5 and 3 are 8 (raising 3 on the other hand); 4 + 3 (raised fingers) = 7 tens; 1 × 2 (bent fingers) = 2 units; 70 + 2 = 72.

In addition to the sources above cited, consult Stoy, 'Zur Geschichte des Rechenunterrichtes,' dissertation (Jena 1876); Treutlein, in the 'Abhandlungen zur Geschichte der Mathematik' (Bd. I, p. 21); Bombelli, 'L'antica numerazione Italica' (Roma 1876, p. 102); Günther, 'Geschichte des mathematischen Unterrichts im deutschen Mittelalter' (Berlin 1887, p. 12), and 'Untersuchungen zur Geschichte der mathematischen Wissenschaften' (Leipzig 1876).

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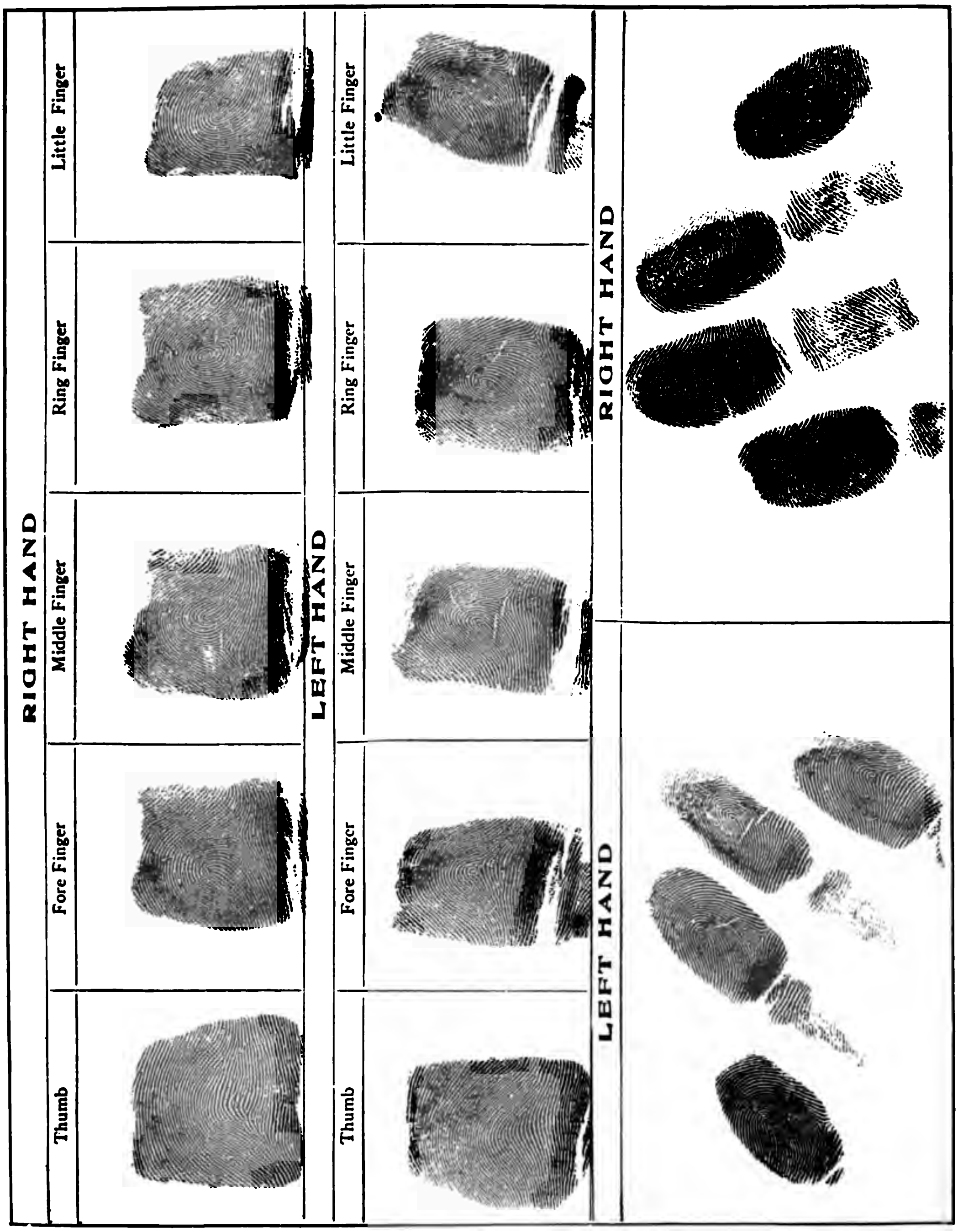
FINGER-PRINTS, impressions from the terminal phalange of the fingers or thumbs, valuable in the identification of individuals because of the fact that the lines vary in each individual from all others. This method of identification of persons has been known and practised in the East since a very early period. In later days it was used with success in legal documents, to prevent false personation, on receipts paid to laborers for wages, etc. More recently it has obtained greater prominence on account of the certainty of its results in identifying criminals, particularly when used in connection with Bertillon's 'Descriptive Signalment' and his 'Signalment by peculiar marks.' It is claimed that the use of the finger-print makes forgery impracticable and is of value on documents where illiteracy is prevalent. Some elaborate plans have been perfected, after much experiment, of classifying finger-prints. Some experts have distinguished four principal types, known as arches, loops, composites and whorls, with seven subclasses. Others have distinguished nine chief classes with many subordinate classes. Investigators, however, find real difficulty in agreeing on a clear, comprehensible method of classification which would be of universal application and this perhaps is the chief handicap to the system at present.

G. Tyler Mairs states that "mechanically there are two kinds of finger-prints: 'plain' and 'rolled.' The 'plain' impression is the one used exclusively by the Chinese, by Purkenje, and later by Herschel. This is made by placing the bulb of the finger flat upon the inking surface and then upon the receiving surface, the resulting impression being elliptical in shape, the long axis being that of the finger itself. The 'rolled' impression is made by placing the digit on the inking surface, radial side in contact, the finger-nail perpendicular to the inking surface, then rolling the bulb of the finger until the ulnar side is in contact and the nail is again perpendicular but reversed in position. The bulb being thus inked, the same operations are repeated on a paper form suitable for recording the impression. This operation produces a cylindrical projection of the ventral surface of the digit which graphically delineates the ridge configuration in all its minutiæ. Thus it will be seen that a friction-skin impression (finger ,palm or sole) is a graphical record, by personal contact, of an external physical characteristic capable of being recorded for future reference." The Chinese, like the Gypsies and many other peoples, tell fortunes by the lines upon the inside of the fingers, but the friction-skin impression "possesses no occult powers of character revelation; in its gross and minute features, however, it is so permanently individual that it is an unerring revealer of personal identity throughout one's lifetime and as long thereafter as the cutis is preserved." Epidermic ridges are still present and plainly seen in Egyptian mummies, and after a simple treatment have been definitely traced on the hands and feet of the bodies of prehistoric cliff dwellers of southern Utah.

On the researches of Herschel and Sir Francis Galton (qq.v.) Sir Edward Richard Henry, G. C. V. O., commissioner of police of the metropolis, London, England, "built the extensively used Henry System of Finger Print Classification, which enables one familiar with its intricacies to make a set of ten apical impressions or dermatographs, classify it, and produce the person's history record (assuming one on file) in a period of time varying from five to fifteen minutes. Under this scientific system nothing is required of the subject save the set of ten apical dermatographs. Given this and nothing more, no name, no address, no physical description or photograph, the identifier 'solves for x,' to use an algebraic term. A record being produced, the subject's medical history, for instance, in the case of a hospital or clinic for the feeble-minded or insane, is at once available, no matter how long the interval between

FINGER PRINTS



treatments, or the changed facial appearance of the subject, or similarity in names.»

Many extraordinary cases are on record of criminals having been traced after accidentally leaving finger-prints at the places where the crimes were committed. In a few instances such evidence has been used in court, but cases of conviction are rare because evidence of identity is not equivalent to evidence of guilt, which must be shown by other proofs of a convincing or corroborative nature. There is a tendency to-day among criminologists to hold to the opinion that the system is most valuable when used in conjunction with other systems of identification. Consult Mairs, G. T., ‹Identification of Individuals by means of finger-prints, palmprints and soleprints› (in *Scientific Monthly*, Lancaster, Pa., October 1918).

FINGER AND TOE, a plant disease (*Plasmodiophora Brassicæ*) which attacks cabbages, radishes, turnips and other members of the order *Cruciferæ*. It is also known as Club Root or Anbury and is one of the Slime-fungi or Myxogastres. Its presence is heralded by the appearance of warty outgrowths on the root, which sometimes swell out to a large size and rot, the while emitting an unpleasant smell. Spores in the soil enter the root and bring on the disease. When the root decays great masses of spores are set free in the soil. Quicklime is the best preventative, as a single application suffices to destroy the spores in the soil. Diseased plants should be burned.

FINIAL, in architecture, the termination of a pinnacle, buttress, gable or canopy, consisting of a carved ornament, usually a bunch of foliage, formed by joining the crockets running up the gable, buttress or spire, as the case may be. Finials were common in Greek architecture and are frequently met with in all styles.

FINIGUERRA, fē′nō-gwĕr′rą, **Maso (Tommaso)**, Italian goldsmith and engraver: b. Santa Lucia d'Ognissanti, 1426; d. December 1464. Vasari's account of this artist, in which he is honored as the inventor of line engraving, is no longer accepted, recent research having proved it erroneous. From contemporary documents we know that he was the son of Antonio and grandson of Tommaso Finiguerra, both goldsmiths. He was educated in his father's profession and became distinguished in that field. In 1449 we find mention of one of his works and in 1452 he delivered a niellated silver pax to the baptistery of Saint John. About this time he was a partner of Piero di Bartolommeo di Sali and of Antonio Pollaiuoli in 1457. He executed waist buckles for the wealthy Cino di Filippo Rinuccini in 1462 and in the following year drew cartoons, the heads of which were colored by Alessio Baldovinetti, for several figures for the sacristy of the duomo. Consult Baldinucci, ‹Notizie dei professori di disegno› (Florence 1845); Colvin, S., ‹A Florentine Picture Chronicle› (London 1898); Duchesne, ‹Essai sur les nielles› (Paris 1824); Cellini, Benvenuto, ‹I Trattati dell orificeria.›

FINING, the process of clarifying turbid liquors such as beer or wine. The simplest process of clarification is that of passing the liquid through charcoal or other porous material. Soluble albumen is used extensively for clarifying liquids containing mucilaginous or gummy matter. Malt liquors are clarified by means of gelatin, as isinglass. Alum, sodium carbonate and salts are used for spirits, but the use of salts is objectionable because many are poisonous. Consult Gardner, ‹Brewer, Distiller and Wine Manufacturer› (London 1883).

FINSTER MOUNTAINS, a chain in Kaiser Wilhelms Land, which reaches an elevation of 11,312 feet.

FINISTÈRE, fē′nē′-stăr, or **FINISTERRE**, the most western department of France, formed from part of the old Duchy of Brittany and bounded on the north by the English Channel, west and south by the Atlantic Ocean and east by the departments of Côtes-du-Nord and Morbihan. Its area is 2,713 square miles. Two chains of hills cross the department from east to west and divide it into three zones. The Douron, Penzé, Flèche, Elorn, Odet, Aven, Isole, Ellé and Aulne are the principal rivers. The coast is rugged, steep and rocky and dangerous at several points. The chief indentations are the Brest roadstead and the bays of Douarnenez and Audierne. There are a number of islands and rocks lying off the coast, the chief of which are Ushant and Batz. The climate is temperate, but very humid. Much of the surface of the department is covered by forest, heath and waste land, but the remainder (about two-thirds) produces buckwheat, barley, oats, rye and wheat in considerable quantities. Hemp, flax, fruits, asparagus, artichokes, onions and melons are extensively grown in the neighborhood of the Brest roadstead. Farm and dairy produce is plentiful and cattle and horses are raised in large numbers. The coast fisheries, particularly the pilchard fishery, are of prime importance and furnish employment to a large number of persons. Finistère has coal deposits and quarries of granite, slate, pótter's clay, etc. The lead and silver mines of Poullaouen and Huelgoat were formerly large producers of these metals, but are no longer worked. The department's manufactures comprise earthenware, candles, fertilizers and chemicals from seaweed, ropes, sail-cloth, linens and woolens, paper, leather and agricultural implements. Brest has large iron foundries and shipyards. The chief ports are Brest and Morlaix. Quimper is the capital. Pop. 809,771.

FINISTERRE, Cape. See CAPE FINISTERRE.

FINITE SERIES. See SERIES.

FINK, Albert, American civil engineer: b. near Frankfort-on-the-Main, Germany, 1827; d. 1897. He was graduated at the Polytechnic Institute of Darmstadt in 1848 and came to America in 1849. He entered the employ of the Baltimore and Ohio Railroad Company as a draughtsman and for that company he designed and built some of the earliest iron bridges in the United States. For the Louisville and Nashville Railroad he built a bridge over the Ohio River at Louisville, Ky. In the Civil War he was engaged by the Federal government as superintendent of the road and machinery department. From 1865 to 1875 he was general manager and from 1870 to 1875 vice-president of the Louisville and Nashville Railroad. He brought about a merger of four trunk railroads of the South and worked out the details of operating the system, which in its day was revolutionary.

FINK, Louis Maria, American Roman Catholic prelate: b. Triftersberg, Bavaria, 1834; d. Leavenworth, Kan., 17 March 1904. He came to the United States in 1852, was ordained priest 1857 and was successively stationed at Bellefonte, Pa.; Newark, N. J.; Covington, Ky.; and Chicago. Later he became prior of the Benedictine monastery, Leavenworth, Kan. In 1871 he was consecrated titular bishop of Eucarpia and appointed coadjutor to Bishop Miege, vicar apostolic of Kansas. He was transferred to the diocese of Leavenworth in 1877.

FINLAND, Grand Duchy of (called by the natives, Suomen-maa, «land of marshes»), a country of northern Europe, including, with the exception of part of Lapland, a territory on the northwest of Russia. It is bounded on the north by Russian Lapland; east by the province of Archangel and Olonetz; south by Lake Ladoga, the province of Petrograd, and the Gulf of Finland; and west by Sweden and the Gulf of Bothnia; length, 600 miles; average breadth, about 240 miles; area, 144,255 square miles.

Topography.— Finland, which was formerly divided into eight provinces, consists principally of a tableland from 400 to 600 feet above the level of the sea and interspersed with hills of no great elevation. In the north, however, the Manselka Mountains have an average height of between 3,000 and 4,000 feet. The coasts, particularly on the south, are surrounded by a vast number of rocky islets, separated from the mainland and from each other by intricate and narrow channels, rendering the shores of the country easy of defense in case of hostile attack by sea. The chief natural feature of Finland is its many lakes, which extend like a network over a large proportion of its surface; some of them being of very considerable size. The greater number of these are in the south and east; several of them have intercommunication and they generally abound with islands. There are numerous rivers, but none of much importance.

Climate.— The climate is rigorous. Even in the south the winter lasts from six to seven months, and in the north from eight to nine months. Dense fogs are very frequent; heavy rains take place in autumn, and in May and June the thaws put a stop to nearly all traveling. In the north the sun is absent during December and January; but during the short summer, while the sun is almost constantly above the horizon, the heat is often very great; and near Uleaborg, in about latitude 65°, the corn is sown and reaped within six or seven weeks. Crops in all parts of the duchy are exposed to the double danger of being destroyed by sudden frosts, and by the ravages of a variety of caterpillar called turila by the natives.

Various.— The principal geological formations are granite, which very easily disintegrates, hard limestone and slate. The soil for the most part is stony and poor. Iron, copper, marble and sulphur are the chief minerals. Rye, oats and barley are grown. The most important products are timber, potash, pitch, tar and resin, which are extensively exported. Next to agriculture, stock breeding and fishing form the leading occupations of the inhabitants. The chief imports are salt, grain and articles of clothing. Finland's imports in 1914 amounted to $76,032,800 and exports to $57,036,000.

History.— The Finns were pagans and most aggressive. They frequently attacked the neighboring countries, but especially Sweden. They continued to live under their own independent kings till the 12th century, about the middle of which the country was conquered by the Swedes, whose king followed up the physical conquest by sending to the Finns the English-born bishop of Upsala, to preach Christianity to the people. The province of Wiborg was conquered and annexed to Russia by Peter the Great in 1721; the remainder of the country became part of the Russian dominions (also by conquest) in 1809. The Russian government endeavored, by conciliating the Finnish party and promoting objects of national importance, to attach the bulk of the population to its interests; but in this it is said not to have been eminently successful, and since 1897 a repressive policy, aiming at the thorough Russification of the grand duchy, has been pursued. The natural result has been resistance — sometimes violent, at other times taking the form of pacifically organized protest, but always determined and resolute. Witness the assassination of Governor-General Bobrikoff, 16 June 1904. Again witness the public demonstrations a year or so later, converging simply informal demands for the restoration of ancient rights or privileges. The results have been far indeed from measuring up to the desires of the Finns. Such as they are, they are indicated in the following paragraph.

Government and Education.— The basis of the constitution is that established in 1772 under Swedish domination, although this, reformed in 1789, slightly modified in 1869 and 1882, was again substantially or radically reformed in 1906. Before that time the National Parliament or Diet consisted of the four estates, the nobles, clergy, burghers and peasants; at present there is but one Chamber of 200 members chosen by direct vote. Every Finnish citizen (man or woman) 24 years of age or over and not disqualified by pauperism, etc., has the right or privilege of suffrage. Both sexes are eligible to the Diet. The grand duchy is divided into 16 electoral districts and each district is subdivided into voting circuits. The Diet lasts for three years unless sooner dissolved and each session for about 90 days.

The educational system is well planned and has good results. According to statistics for 1915 the number of students at the university was 3,435, including 799 women, and the technical high school had 516 students, including 27 women. There are in the capital 2 commercial high schools, 72 lyceums, 16 continuation classes for boys and girls, 22 elementary schools for boys and girls, 25 girls' schools, 40 preliminary schools; in the country 3,179 primary schools (of higher grade) with 149,026 pupils, and schools of lower grade with 73,335 pupils. There are also training colleges for teachers, navigation schools, commercial, technical, horticultural and forestry schools, etc.

Language and Literature.— The language of the Finns (Finnish or Chudic) belongs to the northern division of the Ural-Altaic family of languages and is most nearly allied to the languages of the Esths, Lapps, Mordvins, Voguls and Hungarians. It possesses all the German vowels, *a, e, i, o, u, ä, ö, ü*, which again give eight double vowels and 12 diphthongs. Like the other Altaic languages it adheres to the "law of harmonic sequence of vowels," according to which the vowels are divided into classes, heavy (*a, o, u*) and light (*e, i*, etc.), and only vowels of the same class can occur in the same word. The language is remarkably rich in declensional forms, there being as many as 15 different cases expressing such relations as are expressed in English by *near, to, by, on, in, with, without, along*, etc. By this means these cases are made to express the relations of space, time, cause, etc. There is no distinction of gender in Finnish nouns. The possessive pronoun is indicated by suffixes. The verb resembles the noun in its capability of taking on different shades of meaning by corresponding modifications and is in this respect a remarkable philological phenomenon. The Finnish proper is divided into three principal dialects, the Karelian or eastern; the Savo in central Finland; and the Tavastian in the west. This latter was used in the original translation of the Bible and thus became the parent of the literary Finnish.

Finnish literature is valuable chiefly for its rich stores of national poetry, which has been collected only in modern times. Longfellow's ‘Hiawatha’ is, in style, an imitation of the Finnish epic. The old and popular poetry of the Finns, as it appears in the various *runor* or ballads, is governed by rules of "quantity" as in that of the Greeks and Romans, not by accent; rhyme occurs only rarely; alliteration is employed as a rule. These poems, which had been preserved by oral tradition, were collected by Lönnrot, and in 1835 he published them, under the title of ‘Kalevala,’ with a second enlarged edition in 1849. He also published in 1840 ‘Kanteletar,’ a collection of 592 ancient lyric poems and 50 old ballads; the ‘Suomen kansan sanalaskuja’ (1842), a treasury of 7,077 popular proverbs; and ‘Suomen kansan arwoituksia’ (1844), a collection of 2,188 riddles. Another work that deserves notice is Eero Salmelainen's collection of legends and stories in prose, ‘Suomen kansan satuja ja tarinoita’ (4 vols., 1854–62). The first book in the Finnish language was printed at Abo in 1544, its author being Michael Agricola, afterward bishop of Abo, who also translated the New Testament and part of the Old into Finnish. A complete Finnish Bible appeared in 1642. Lönnrot's Finnish-Swedish dictionary has been published by the Finnish Literary Society and Dr. Donner has a dictionary of the Finno-Ugric languages in German. Finnish is becoming more and more the vehicle for imparting instruction. There are many establishments for the higher education of both sexes in which the Finnish tongue is used, and about half of the students at Helsingfors University speak Finnish. Works on science and history, as well as poetry, have been written in Finnish in recent times, and there are now a considerable number of Finnish newspapers. Population (estimate by the Russian Central Statistical Committee 1 Jan. 1914), 3,241,000. Pop. of Helsingfors, the capital (with Sveaborg), 167,083.

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FINLAND, Gulf of, an arm of the Baltic Sea, on the east side, having Finland on the north and the Russian governments of Esthonia and Petrograd on the south. The length of the gulf from east to west is about 250 or 260 miles; breadth at the entrance or narrowest part, 40 miles; toward the head, where it is widest, about 80 miles. It receives but few rivers, and none of them, with the exception of the Neva, which enters it at its upper extremity, of any great size. There is river-and-canal connection with Lakes Ladoga and Onega. It contains numerous islands of which Kronstadt (q.v.) is the largest. Helsingfors, Reval and Viborg are on its shores; Petrograd is on its eastern extremity.

FINLAY, Charles John, American physician: b. Puerto Principe (Camagüey), Cuba, 3 Dec. 1833; d. Havana, Cuba, 20 Aug. 1915. His collegiate education took place at the Rouen Lycée, France, his medical studies at Jefferson Medical College, Philadelphia, Pa., under the preceptorship of Dr. Mitchell (S. Weir Mitchell's father), from which he graduated in 1855. Shortly afterward he established himself in Cuba. His scientific life was very active, his principal achievement being the discovery in 1881 of the theory of transmission of yellow fever by the mosquito, confirmed later on experimental lines. His work received full confirmation at the hands of the American Commission in 1899. In 1881 he was a delegate to the International Sanitary Conference at Washington, and on the establishment of the Cuban Republic was several times sent to different scientific congresses in the United States as delegate for Cuba. In 1902 he was appointed chief sanitary officer of Cuba which position he held till 1909 when he was retired with a pension and the honorary title of president of the Board of Sanitation and Charities. He was a member of all the local medical societies and corresponding member of numerous foreign societies. He was awarded the Mary Kingsley Medal, the Briand Prize, and was named Officier de la Legion d'Honeur and corresponding member of the French Academy of Medicine.

FINLAY, George, English historian: b. Faversham, Kent, 21 Dec. 1799; d. Athens, Greece, 26 Jan. 1875. Fired with enthusiasm on behalf of Greece he went to that country to help it in shaking off the Turkish yoke, and spent some time at Missolonghi in close intimacy with Lord Byron. He purchased land in Attica, and henceforth lived chiefly in Greece. His great work on Greek history came out at intervals between 1844 and 1861, and shortly after his death it was published as thoroughly revised and greatly improved by himself, entitled ‘A History of Greece from its

Conquest by the Romans to the Present Time, 146 B.C. to 1864 A.D.' It has been described as the greatest historical work in English since Gibbon's 'Decline and Fall.'

FINLEY, John Huston, American author and educator: b. Grand Ridge, Ill., 19 Oct. 1863. He was educated in the public schools of Illinois, at Knox College, A.B. 1887, A.M. 1890, and at Johns Hopkins University. He served, 1889–92, as secretary of the State Charities Aid Association of New York, founding and editing the *State Charities Record* 1889 and *The Charities Review* 1891, and establishing for the first time on an adequate basis professional American literature of scientific philanthropy. He was called to the presidency of Knox College, 1892–99, returned to New York, 1899, to enter upon editorial work with Harper and Brothers and the S. S. McClure Company, but was the next year called to a newly established chair of politics in Princeton University, 1900–03. From this position he was elected president of the College of the City of New York 1903–13. Under his able administration the City College not only was reorganized and moved into its magnificent new buildings on Washington Heights but became a prototype of a new kind of educational institution, the municipal university supported by the city, free to the youth of the city and having its function in the development of an alert, intelligent, municipal spirit. He was in 1913 the unanimous choice of the Board of Regents for President of the University of the State of New York and Commissioner of Education. As the head of the entire educational system of the State he has been able to revitalize the ancient and honored conception of its founders: the idea of a real «federation of learning» to include all the educational and cultural institutions of the State. Mr. Finley was Harvard University exchange lecturer at the Sorbonne, Paris, on the Hyde Foundation 1910–11. He rendered great service to the cause of industrial peace as a member of the Arbitration Board in the Eastern Railway Controversy 1913, and to his State as chairman of the State Commission for the Blind, 1913, and as a member of the New York Constitutional Convention Commission, 1914. In 1914 King Victor Emmanuel awarded the title of Chevalier of the Crown of Italy to Dr. Finley in recognition of his efforts to create interest in Italian art and literature. He was also awarded the gold medal of the Conrad Malte-Brun Prize by the Geographical Society of Paris in recognition of his book, 'The French in the Heart of America.' In the European War, he served as chairman of the committee of the Red Cross and allied subjects of the National Education Association, and as colonel in charge of a Red Cross unit visited Palestine in 1918, traveling from Egypt to Jerusalem by airplane. He is a frequent contributor to educational and literary magazines, and is the author of 'Taxation in American States and Cities' with R. T. Ely (1888); 'The American Executive and Executive Methods,' with Mr. J. F. Sanderson (1908); 'The French in the Heart of America' (1915), and is editor-in-chief of 'Nelson's Encyclopedia.'

FINLEY, John Park, American meteorologist: b. Ann Arbor, Mich., 11 April 1854. He was educated at the State Normal School and State Agricultural School. He became assistant to the chief signal officer at Washington. He instituted the system of meteorological reports from localities where there were no regular signal-service officers by means of volunteer observers. He was placed in charge of the Signal Service Bureau on the Pacific Coast, where his observations were of great value. In this position he has given much attention to the phenomena of meteorology, and has written extensively upon the subject. His works include 'Tornadoes' (1887); 'Manual of Instruction in Optical Telegraphy' (1889); 'Sailor's Handbook of Storm-Track, Fog, and Ice Charts of the North Atlantic and Gulf of Mexico' (1889); 'Essay on the Development of Tornadoes' (1890); 'Certain Climatic Features of the Two Dakotas' (1893).

FINLEY, Martha (pseudonym of MARTHA FARQUHARSON), American writer for girls: b. Chillicothe, Ohio, 26 April 1828; d. Elkton, Ind., 30 Jan. 1909. She published 'Elsie Dinsmore' (1868); 'Wanted — A Pedigree' (1872); 'The Thorn in the Nest' (1886); 'Twiddledetwit' (1898), etc.; the 'Elsie Books,' over 25 in number; and 'The Mildred Books.'

FINLEY, Robert, American clergyman, founder of the Colonization Society: b. Princeton, N. J., 1772; d. 1817. He was graduated at Princeton College in 1787, and was successively teacher in Princeton, Allentown, N. J., and Charleston, S. C. He returned to New Jersey in 1794, was licensed as a minister at New Brunswick, and in the following year became pastor at Basking Ridge, N. J. He was an earnest student of the negro question and convinced himself that the sole solution of that question lay in the colonization of the negro in some region remote from the whites. In 1816 he founded the Colonization Society at Washington, D. C. He returned to New Jersey early in 1817 and there organized an auxiliary society. In the same year he became president of the University of Georgia.

FINLEY, Samuel, American Presbyterian clergyman: b. Armagh, Ireland, 1715; d. Philadelphia, 17 July 1766. Arriving in America in 1734, he was licensed to preach in 1740. The first part of his ministry was much occupied with itinerant labors in promoting the revival of religion, at that time so remarkable throughout the country. His zeal at one time brought him into unpleasant circumstances; for preaching in New Haven, Conn., contrary to a law of the colony forbidding itinerants to enter parishes of settled ministers without their consent, he was seized by the civil authority and carried as a vagrant beyond its limits. In 1744 he was settled at Nottingham, Md., where he remained for seven years, and where, in addition to his ministerial duties, he carried on an academy which acquired a high reputation. In 1761 he became president of the College of New Jersey, now Princeton University.

FINN, Frank, English naturalist, author and lecturer: b. Maidstone 1868. He was educated at the Maidstone Grammar School and at Brasenose College, Oxford. In 1892 he went on a collecting expedition to East Africa, was first assistant superintendent of the Indian

Museum, Calcutta, in 1894, and deputy superintendent from 1895 to 1903. He edited the *Avicultural Magazine* in 1909–10 and the *Zoologist* in 1915–16. His publications include 'Fancy Waterfowl' (1900); 'Fancy Pheasants' (1901); 'Birds of Calcutta' (1901); 'Indian Ducks' (1901); 'Garden and Aviary Birds of India' (1906); 'Indian Waders' (1906); 'Ornithological and Other Oddities' (1907); 'Birds of the Countryside' (1907); 'Pets and How to Keep Them' (1907); 'The World's Birds' (1908); 'Wild Beasts of the World' (1909); 'Eggs and Nests of British Birds' (1910); 'Talks about Birds' (1911); 'The Game Birds of India and Asia' (1911); 'Wild Animals of Yesterday and To-day' (1913); 'Indian Sporting Birds' (1915), and many scientific papers, chiefly in *Journal* of the Asiatic Society, and popular articles. He was collaborator of Douglas Dewar in 'The Making of Species' (1909).

FINNEY, Charles Grandison, American Congregational minister: b. Warren, Conn., 29 Aug. 1792; d. Oberlin, Ohio, 16 Aug. 1875. He went to Oneida County, N. Y., in early life and was ordained minister 1824, becoming professor of theology at Oberlin College in 1835 and its president in 1852. He was one of the most famous of American revivalist preachers. Among his works are 'Lectures on Revivals' (1835; new ed., 1868); 'Lectures to Professing Christians' (1836); 'Sermons on Important Subjects' (1839); 'Lectures on Systematic Theology' (1847); 'Autobiography,' and 'Sermons on Gospel Themes' (1876).

FINNS, in their own language called *Suomalainen,* and by the Russians *Chudes,* are in the narrower sense a race of people inhabiting the northwest of European Russia (governments of Archangel and Olonetz), but especially the grand duchy of Finland. In a wider sense Finnic is the name applied to the Finno-Ugric, one of the five chief branches of the northern or Uralo-Altaic family of peoples and languages. These peoples were formerly spread over the whole north of Asia and north of Europe, and they are divided into the five families, the Tungusic, Turkic, Mongolic, Samoiedic, and Uralo-Finnic or Finnic family proper. The last or most westerly family still forms the population of north Europe and northwest Asia, and formerly covered the greater part of Scandinavia. It is again divided into four groups or branches (1) the Ugric, to which the Ostiaks, Voguls and Magyars belong; (2) the Bulgaric or Volgaic, consisting of the Tcheremisses and the Mordvins; (3) the Permic, composed of the Permians, Sirianes and Votiaks; and (4) the Chudic or Baltic group. To the last belong, besides the Finns proper, the Esths of Esthonia and the Lives or Livonians, the Chudes (in the narrower sense), that is, Karelians, Vepses and Votes, in the governments of Novgorod and Olonetz, and the Lapps in Archangel and the northern parts of Finland, Sweden and Norway. The Finns proper are divided into two branches: the Tavastians in the southwest, and the Karelians in the east of Finland. The Finns may properly be identified with the Scythians, and their earliest seats appear to have been the Ural Mountains and the neighborhood of the Caspian Sea. They originally led a peaceful nomadic life, but subsequently practised agriculture and adopted settled habits. They seem to have been compelled to migrate more to the northwest about the beginning of the Christian era by the pressure of the Gothic tribes, and the country west of the Ural Mountains, more particularly the region where the Great and Little Volga unite, became their second home. From this the bulk of them had again to remove to their present abodes, though considerable numbers were left on the Volga, Oka, Kama, about the sources of the Dwina, in the Ural, and others again spread eastward, some of them as far as the Altai Mountains. The Finns are a serious people, and their so-called amusements show this trait. They are educated and have most decided opinions as to "Woman's rights," political rights being accorded to both sexes; coeducation is the rule. Although Finland has been united with Russia, or a part of Russia, since 1809, yet the better educated Finns speak the Swedish language. The emperor encourages the use of the Finnish language. The Finns are communicative on business matters and often do not hesitate to tell what other people might call "family secrets." They ask freely about the affairs of others. They have choirs and musical societies in Finland, and where found in other countries they show a love for music, although their music lacks all suggestions of joyousness. See FINLAND.

FINOTTI, Joseph Maria, American Roman Catholic clergyman and author: b. Ferrara, Italy, 1817; d. Denver, Colo., 1879. He studied theology in the Jesuit College, Rome, and in 1845 removed to the United States. In 1852 he left the Jesuit Society and became literary editor of the Boston *Pilot.* His works include 'A Month of Mary' (1853); 'Italy in the 15th Century,' 'The French Zouave' (1863); 'American Catholic Bibliography' (unfinished).

FINS (of Fishes). See FISH.

FINSBURY, England, a metropolitan and parliamentary borough in central London; area, 586 acres. It is a poor and densely populated district, the centre of the watch and jewelry trade, printing and paper making being the other important industries. The Charterhouse (q.v.) is its most interesting historical building. Bunhill Fields marked the site of an old Non-Conformist place of interment, in which John Bunyan, Defoe and George Fox were buried. Saddler's Well was at one time a favorite place of resort. The borough returns three members to Parliament. Pop. 87,923. Consult Cromwell, 'History and Description of the Parish of Clerkenwell' (1828); Milton, 'Fascination of London' (1906); Pink, 'History of Clerkenwell' (1865).

FINSEN, Niels Ryberg, Danish physician, scientist and discoverer of the method of curing lupus or tuberculosis of the skin, and other skin diseases, with light rays: b. Iceland in 1860; d. Copenhagen, Denmark, 24 Sept. 1904. Professor Finsen's great discovery, that sunlight and electric light rays contain properties that can be used to cure skin diseases and blemishes, was the outgrowth of his experiments begun as a student in the Copenhagen University.

In 1890 Finsen was graduated from the Copenhagen University, receiving his doctor's degree. Three years later he published in a medical journal an article on ‘The Influence of Light on the Skin,’ which aroused general attention because of his assertion that cases of smallpox could be cured by putting red curtains at the windows of the sick-room. Smallpox became epidemic in 1894 in Copenhagen and the new method was put to the test. The red-room treatment became popular with both the medical profession and the public, for by it not only was the disease cured, but the red rays prevented suppuration and left the patient unmarked by the dreaded scars.

The red-light treatment was but one application of Finsen's theory that light rays contained healing, and at the best it was but a negative result; it cured only when the disease had run its course. To develop the positive element of the light-ray cure, Finsen began experimenting with artificial light rays. Soon he found it possible to concentrate rays of the ordinary electric light in such a way as to cure a lupus patient who for eight years had tried every known method. The cure attracted great attention, and both moral and financial support came to the young investigator and discoverer. In 1896 the municipal hospital of Copenhagen gave room on its ground for several small buildings, in which Finsen's experiments continued on an increasing scale. Then the Danish government came to the support of the institution and it was enlarged and removed to Rosenvaenget, a pleasant suburb of Copenhagen. Many cures of cases previously deemed hopeless were made through the new and enlarged apparatus, the high-power Finsen lamp, which was used under the direction of a staff of physicians of national renown, expert electricians and specially trained nurses, headed by Finsen. To Finsen is due also the discovery that certain rays of the sun's spectrum are bacteria-destroying, while others are of a healing and curative nature. In December 1903 Finsen received the Nobel medical prize from the Norwegian Parliament. Institutions for the use of the rays are now established in every civilized country. See FINSEN LIGHT; PHOTOTHERAPY.

FINSEN LIGHT, Finsen ray, blue light, actinic ray, violet and ultra-violet ray, light cure. The Finsen Light takes its name from its discoverer, Niels R. Finsen, who discovered that the actinic rays, those represented in the blue, indigo, violet and ultra-violet sections of the solar spectrum, possess strong bactericidal power, and when concentrated and applied, they will destroy bacteria in five or six minutes.

While the bactericidal features of the violet rays were known experimentally in 1877, lacking the scientific basis, believing the discovery to be a cure-all, «the blue light» was laughed at as quackery. It remained for Finsen to make a practical application of the facts in treating certain diseases previously supposed to be incurable. The Finsen Light is a large, specially constructed arc lamp of 40,000 candle power, or 40 times stronger than an ordinary arc street lamp, and uses from 60 to 80 amperes of current of 110 voltage. This lamp burns a specially made carbon. In the upper holder is a large carbon, while a smaller one is used in the bottom holder. When properly adjusted for arcing, a maximum number of violet and ultra-violet rays are produced. The light from this lamp is so intense it is impossible to look at it with the naked eye, and it is necessary for all the attendants and patients to wear smoked glasses while the lamp is in operation. An aluminum hood about two feet wide surrounds the lamp, which hood is fringed on its lower border with a deep crimson-colored paper skirt to further aid in excluding the diffused light from the patient. The concentrated rays are carried from the arc to the patient through four telescopic tubes, known as converging tubes, suspended at an angle of 45 degrees. Each tube contains a series of rock crystal lenses, which are very expensive, but are used because they absorb a greater amount of heat rays, but do not interfere with the passing of chemical rays. These rock cystal lenses are so arranged that reservoirs for running water exist between them. By means of these water screens and the rock crystal lenses, all rays but the violet are eliminated. These rays are converged, concentrated and filtered, thus vastly increasing the healing and bactericidal effects. The heat from the original arc is so intense, that to prevent cracking of the lenses a stream of cold water is kept constantly circulating through the upper reservoirs or water screens. To further concentrate and cool the rays a compressor is provided which consists of two rock crystal lenses so arranged in a brass band that a chamber for running water exists between them. This part of the apparatus is used to compress the affected area and make it bloodless during treatment, which facilitates deeper penetration, as the red blood corpuscles have a tendency to obstruct or absorb the actinic rays. See FINSEN, N. R.; PHOTOTHERAPY.

FINSTERAARHORN, fĭn'stĕr-är'hôrn, Switzerland, the highest peak of the Bernese Alps, with an elevation of 14,025 feet. See ALPS.

FINSTERWALDE, fĭn'stĕr-väl'dę, Prussia, a town on the Schackebach, a tributary of the Little Elster, 28 miles southwest of Cottbus and 40 miles north of Dresden. It has a Gothic church, built in 1581, a chateau, schools, and manufactures cloth, cigars, castings, machinery, furniture, rubber goods, soap, glass, bricks, etc. The town is first mentioned in 1288 and came into the possession of the Elector of Saxony in 1635 and was joined to Prussia in 1815. Pop. 13,111.

FIOCCHI. See FENESTELLA.

FIOGO. See KOBE.

FIONN. See FIONN MACCUMHAIL.

FIONN MAC CUMHAIL, fĭn măc-cool (O. I. *Find Mac Cumhail*, Fionn, son of Cumhal), Irish epic hero, leader of the Fianna, or Fenians, a band of professional warriors and hunters of the 2d or 3d century of the Christian era. In Scotland he is often called Fingal, which is variously interpreted as Fionn the Gael (*Fionn Gaedhal*) or Fionn the Stranger (*Fionn Gall*), which would indicate an alien origin. As in all ancient sagas, there is much of myth in the story of his life and exploits, but there appears no reason to doubt of his having actually existed and to have been the leader of a band of warriors. His father, Cumhal, mac Trénmóir, was uncle of Conn Ceadcathach. Ardri of Ireland, who died A.D. 157. Cumhal was a prominent leader of the warriors of Leinster but was slain by Gol mac Morna, leader of the Connacht warriors, in revenge for his having carried off Murna Munchaem, the daughter of a druid. Fionn was born after his father's death and on reaching manhood became leader of the Fianna, supplanting Gol mac Morna, who assumed the leadership after the death of Cumhal. Fionn's headquarters were generally located at Almhain (Allen), in Kildare. But he often led the forces of the Fianna in other parts of Ireland in repelling invaders on the coast, etc. His wooing of Grainne, daughter of Cormac, and her elopement with Diarmuid form the subject of one of the most celebrated sagas of the so-called Fenian cycle. Fionn at length overcame Diarmuid and became the husband of Grainne. The sagas have much to say of his principal aides, of whom the most important were his son Oisin (Scottish Ossian), his grandson Oscar, Cailte mac Ronain, and the aforementioned Diarmuid. The sagas also dwell on the magnificence of Fionn's abode, his hospitality, the chivalry of his followers and even give lists of his hounds, the most celebrated of which was Bran. Fionn is said to have come to his death by treachery in 252 or 283 A.D. Tales of Fionn and his warriors are told to this day in Scotland and Ireland. (See CELTIC LITERATURE; MACPHERSON, JAMES; OSSIAN). Consult Hull, E., 'Textbook of Irish Literature' (2 vols., Dublin 1910); Hyde, Douglas, 'Literary History of Ireland' (London 1906); Maclean, 'Literature of the Celts' (ib. 1906).

FIONNI, fē-ōn'nē, **Matteo,** Italian geographer: b. Felizano, Piedmont, August 1827; d. Bologna 1901. He was instructor in the University of Turin 1848-60, then becoming professor of geodesy at the University of Bologna. Among his works are 'Le Allusione' (1878); 'Le Proiezioni della carte geografiche' with atlas (1878); 'Note ipsometrische sopra la regione bolognese' (1883); 'Mesure offerte delle carte geografiche' (1887); 'Le Projezione cuneiform' (1889).

FIORD, fyôrd, a long, narrow and deep arm of the sea, extending far back into the land. Fiords frequently have the broadly U-shaped cross section and the hanging tributaries characteristic of glaciated valleys. In some cases it is believed that the great thickness and weight of the ice enabled the glaciers to actually erode the valley bottoms below sea-level, and that as the ice melted away the sea entered the valleys. In other cases the coast has probably been drowned, allowing the sea to enter the embayments. The coasts of Norway, Alaska, Greenland and Chile are famous for their fiords, and the Hudson River from the head of tidal water at Troy down to New York Bay has the characteristics of a fiord.

FIORE, fyō'rā, **Pasquale,** Italian jurist: b. Terlizzi, Bari, 1837. He was appointed to the chair of constitutional and international law at the University of Urbino in 1863, removing to Pisa in a similar capacity in 1865, to Turin in 1876 and to Naples in 1881. His publications include 'Elementi di diritto constituzionale' (1862); 'Diritto internazionale privato' (1869); 'Trattato di diritto internazionale pubblico' (1879); 'Trattato di diritto internazionale peonale'; 'Diritto internazionale privato' (1901); 'Le droit international codifié et sa sanction juridique' (1911).

FIORE D'URBINO, Il. See BAROCCI, FEDERIGO.

FIORELLI, fyō'rĕl'lē, **Giuseppe,** Italian archæologist: b. Naples, 1823; d. 1896. He was appointed inspector of the excavations and ruins at Pompeii in 1845, but his political views soon rendered him obnoxious to the authorities and his removal followed. In 1860 when the kingdom of Italy was established he was appointed superintendent of antiquities in southern Italy and professor of archæology at the University of Naples. From 1860 to 1875 he directed systematically the excavations at Pompeii and in the latter year became director of all excavations in Italy. He published 'Osservazioni sopra talune monete rare di città greche' (1843); 'Monete inedite dell' Italia antica' (1845); 'Notizia dei vasi dipinti rinvenuti a Cuma dal conte di Siracusa' (1853); 'Pompeianarum Antiquitatum Historia' (1853); 'Descrizione di Pompei' (1875). Consult Man-Kelsey, 'Pompeii: Its Life and Art' (2d ed., New York 1902).

FIORENZO, fyō-rĕn'tsō, **Di Lorenzo,** Italian painter of the Umbrian school: b. Perugia, about 1440; d. there, 1521. Very little is known concerning him and he is not even mentioned by Vasari. Critics, studying the works ascribed to him, most of which are in the Pinacoteca of Perugia, have attempted to tell the masters under whom he studied. His principal works are 'The Nativity'; 'The Adoration of the Magi'; 'The Adoration of the Shepherd'; all in the Perugia Pinacoteca; the fresco of Saints Romano and Rocco at Saint Francesco at Deruta. Other works in the Pinacoteca, in the London National Gallery and elsewhere, have been attributed to him, but there exists a doubt in each case as to the attribution. One of these is a 'Saint Jerome' in the Jarves collection, New Haven, Conn. Perugino was his most famous pupil. Consult Berenson, 'Central Italian Painters of the Renaissance' (New York 1908); Graham, Carlyle, 'The Problem of Fiorenzo di Lorenzo' (Perugia 1903); Hutton, Edward, 'The Cities of Umbria.'

FIR, a name sometimes used as coextensive with the term pine and including the whole genus *Pinus.* In a narrower and stricter sense it is the name of a genus of trees (*Abies*) belonging to the order *Coniferæ,* and the suborder *Abietineæ,* having solitary leaves growing round the branches. The fir is thus distinguished from the pine, the leaves of which grow in twos, threes, fours or fives; and from the cedar and the larch, both of which have the leaves fasciculated The term fir, thus limited, is applied only to the different varieties of the silver fir and the spruce fir. The silver firs are distinguished by having the cones erect, scales deciduous and leaves flat. The common silver fir is the *Abies picea* of botanists, the *Pinus picea* of Linnæus. It is a native of the middle and south of Europe. The finest trees of this species are found in southern Italy; but the largest forests are those on the slopes of the Pyrenees, especially on the French side. It always prefers mountainous regions and is sometimes found at a height of nearly 6,000 feet. The height of the trunk is sometimes

150 feet and the diameter above 6 feet. It is the *sapin* of the French and the *abies* of the ancient Romans. It is from this tree that Strassburg turpentine is procured; and its wood is of great use in shipbuilding (for masts, yards and spars), in house-carpentry, etc. To this genus also belong the *A. sibirica,* found on the Altaian Mountains; the Indian silver fir, a native of the slopes of the Himalaya Mountains; and the *A. canadensis* or hemlock spruce fir. Other species of *Abies,* found in western North America (as also in the Himalayas), are trees sometimes rivaling in size the Douglas fir (mentioned below), and likewise yielding excellent timber. Among them are *A. grandis,* a Californian tree of 170 to 200 feet in height; *A. amabilis,* a species much resembling it; *A. nobilis,* a majestic tree, which forms vast forests on the mountains of northern California; *A. bracteata,* a Californian species remarkable for its slender stem, which rises to a height of 120 feet, and yet is only about one foot in diameter at the base, and likewise for the manner in which the middle lobe of each bractea of its cones is produced so as to resemble a leaf. Very similar to the silver fir, but generally of much smaller size, and indeed seldom much above 30 feet high, is the balm of Gilead fir (*A. balsamea*), a native of North America from Virginia to Canada. The wood is of little value, but the tree yields Canada balsam (q.v.).

The spruce firs have the cones pendulous, scales persistent and leaves tetragonous. Of this division the common or Norway spruce fir (*A. excelsa*) is the most important. It gets the name of Norway spruce from the fact that in that country it constitutes the principal timber; but it is also extensively cultivated in the middle of Europe and is found all over Siberia to lat. 70° N. The average height of the tree is from 80 to 150 feet; and it attains its maturity in about 70 or 80 years. The branches, regularly arranged round the main stem and gradually diminishing toward the top, give the tree a pyramidal form. Nearly every part of this tree is of use. The wood (white or Christiania deal) is adapted to various ordinary purposes; the longest and thinnest stems are very valuable in shipbuilding for making masts; and the stems of those trees that are found at a great height, and in which accordingly the yearly rings are very narrow, are eagerly sought by musical instrument makers for sounding-boards. The bark is used in tanning; the young buds or shoots are used in making the drink known as spruce beer; and the resin which exudes from the tree supplies the common frankincense and the Burgundy pitch of commerce. The so-called Scotch fir is really a pine (q.v.).

The *Pseudotsuga douglasii,* closely related to the firs, and often regarded as a fir, is named after the Scotch botanist, David Douglas, who visited the Pacific Coast during the first half of the 19th century, and is known as the Douglas fir or spruce, red fir, yellow fir, Oregon pine (q.v.), etc. It is one of the most important trees of western America, especially of the Pacific States and British Columbia. It is a noble tree, often attaining a height of more than 250 feet and forms immense forests, especially from lat. 43° to lat. 52°. The bark, when the tree is old, is rugged and is from six to nine inches thick. The tree abounds in a clear, yellow resin. The timber is heavy, firm and valuable, and the growth of the tree is very rapid. See SPRUCE; HEMLOCK.

FIRANGI, fē-răn'gē, an Oriental name for the inhabitants of the Occident, which region is known by the name Firangistan. By some the name is said to be a corruption of Frank and to have originated during the Crusades, by others it is derived from the Varangians or Warings, the Norse mercenaries of the Byzantine emperors. The descendants of the Bengal Portuguese are also known by this name.

FIRBOLGS, or **FIR-BOLGS** (fir-man; bolg'bag; bag-men), a name given to the descendants of one of the colonies of Nemedians, who fled from Ireland to Greece in about 1900 B.C. Nemedia, or Neimheidh, and his wife, Macha, his four sons, 34 ships with 30 persons in each ship, went from Greece to Ireland because some of the lineage of Nemedia had some years before gone from Greece to Ireland. They found in possession of the country Africans called Fomorians or Fomharaighs, and sometimes pirates. After several conflicts between the Nemedians and Fomorians, the Nemedians were reduced to slavery or flight; they chose the latter. Simon Breac led a colony to Greece, where they were also persecuted and made to serve the people whom they found in the country. One of their tasks was to dig «in the low deep soil» and carry the earth in leathern bags to cover and improve the barren places. From this labor came the name Fir-Bolgs or bag-men. After some years of bondage they again took flight to Ireland, no less in number than 5,000 men and women, under five leaders. See IRELAND.

FIRDAUSĪ, fēr-dow'-sē, **FIRDOUSI** or **FIRDUSĪ,** Persian poet: b. Shadab, near Tūs, in Khorassan, about 935; d. there, 1020. With the name of Firdausī in the 10th century of our era, modern Persian poetry may be said to begin. Firdausī, however, really forms only one link in the long chain of Iranian literature which extends over more than 25 centuries, and whose beginnings are to be sought in the Avesta, 500 years before the birth of Christ.

The Mohammedan conquest of Iran by the Arabs somewhat resembles, in its effect upon Persian literature, the Norman conquest of England. Hardly two centuries had elapsed before an Iranian renaissance is begun to be felt in Persia. Firdausī comes 300 years after the battle of Nihāvand, in which the eagle of the Persian military standard sank before the crescent of Allah's prophet and the Mohammedan sword; just as Chaucer followed the battle of Hastings by 300 years.

Such was the literary situation at the end of the 9th century. Firdausī was the poet in whom the wave of the national epos culminated in the 10th century. But as there were English poets who struck the note before Chaucer, so in Persia, Firdausī had his literary predecessors. Abbas of Merv (809) was one of these earlier bards. Of greater repute was Rūdagī (d. 954) who is said to have composed no less than a million verses. But Firdausī's direct predecessor and inspirer in the epic strain was Daqīqī, cruelly murdered when he had sung but a thousand lines. Yet these thousand verses were immortal, as Firdausī has incorporated them into his poem and has thus happily preserved them. They are the lines that describe the founding of the religion of Zoroaster, priest of fire. There was possibly a certain amount of tact on Firdausī's part in using these, or in claiming to employ Daqīqī's rhymes; he thus escaped having personally to deal with the delicate religious question of the Persian faith in the midst of the fanatical Mohammedans, who are said to have assassinated Daqīqī on account of his too zealous devotion to the old-time creed. With Firdausī, then, the new Persian era is auspiciously inaugurated in the 10th century; its further development through the romantic, philosophic, mystic, didactic and lyric movements must be sought under the names of Nizāmī, Omar Khayyām, Jalāl-ad-dīn Rūmī, Sa'dī, Hāfiz and Jāmī.

Firdausī is pre-eminently the heroic poet of Persia. His full name seems to have been Abulqasīm Hasan (Ahmad or Mansur); the appellative "Firdausī" (Paradise), by which he is known to fame, was bestowed upon him, according to some accounts, by his royal patron, the Sultan Mahmūd. By descent he was heir to that Persian pride and love of country which the Arab conquest could not crush. By birth, therefore, this singer possessed more than ordinary qualifications for chanting in rhythmical measures the annals of ancient Iran. He had undoubtedly likewise made long and careful preparation for his task, equipping himself by research into the Pahlavī or Middle Persian sources, from which he drew material for his chronicle-poem. From statements in the 'Shāh Nāmah' itself, we may infer that Firdausī was nearly 40 years of age when he made the real beginning of his monumental work. We likewise know, from personal references in the poem, that he had been married and had two children. The death of his beloved son is mourned in touching strains. One of the crowning events now in the poet's life was his entrance into the literary circle of the court of Sultan Mahmūd of Ghazni, who ruled 998–1030. To Mahmūd the great epic is finally dedicated and the story of Firdausī's career may best be told in connection with the masterpiece.

The removal of the heroic bard Daqīqī by fate and by the assassin's dagger had left open the way for an ambitious epic poet. Firdausī was destined to be the fortunate aspirant. This poet laureate lived long in the sunshine of the court, and was promised a gold piece for each line he composed. The liberality of Sultan Mahmūd's favor called forth from Firdausī a splendid poetical panegyric, that is only eclipsed by the fierce savageness of the scathing satire which later the poet poured out against his royal patron, when disappointed in old age of the promised reward that was to crown his great work.

Tradition narrates that Firdausī was a septuagenarian when he finished the last line of the 60,000 rhyming couplets that make up the 'Shāh Nāmah.' He now looked for the reward of his life's work. But jealousy and intrigue against him had not been idle during his long residence at court. The grand vizier appears to have induced the sultan to send Firdausī 60,000 silver dirhems, instead of the promised gold. Firdausī is said to have been in the bath when the elephant laden with the money-bags arrived. On discovering the deception, the injured poet rejected the gift with scorn, and dividing the silver into three portions, he presented one of these to the bath steward, the second to the elephant-driver and he gave the last to the man who brought him a glass of cordial. He then wrote the famous satire upon Mahmūd, and fled from the city for his life. For 10 years the aged singer was an exile, and he would have been a wanderer but for the friendly protection extended to him by a prince of 'Irāq, who apparently also tried, without effect, to reconcile the sultan and the aged poet. Enjoying the solace of this prince's shelter, Firdausī composed his last work, the 'Yusuf and Zulīkha,' a romantic poem nearly as long as the Iliad, on Joseph and the passionate love of Potiphar's wife for him as related in the Koran.

But Firdausī was now advanced to his 80th year, and he seems to have longed to visit his native town of Tūs once more. A sad story is preserved of his death of a broken heart. It is also told that Mahmūd relented and sent to the city of Tūs a magnificent caravan conveying gifts and robes for the aged singer, and bearing likewise the 60,000 gold pieces that had once been promised. But all too late. The treasure-laden camel procession met at the city gate the funeral cortège that was conducting the dead poet's body to the grave. Firdausī's death occurred in 1020. His tomb at Tūs is still a place of pious pilgrimage.

The story of the 'Shāh Nāmah,'— Book of Kings,— may be described in briefest words as the chronicle-history of the empire of Iran, from the moment of its rise in legendary antiquity and during the golden reign of King Jamshīd, through its glorious ascendency under the majesty of the Kayanian rulers, and down to the days of Zoroaster; thence onward to the invasion of Persia by Alexander the Great. The poem from this point follows the various fortunes and changes of the Persian sovereignty, until its downfall and ruin before the Mohammedans and Islām. Firdausī naturally treats his subject as a poetic chronicler, not as a historian; but there is history in the poem, and he has given a certain unity to his long epic by keeping sight of the aim that he had in view, which was to exalt the fallen glory of Iran. The epic is written in a style befitting the theme.

Up to the beginning of the 19th century the poem existed only in manuscript form. At the expense of the French government it was then published with a French translation in a very elaborate folio edition by J. Mohl (6 vols., Paris 1831–68). A separate, less expensive edition of this French translation was published in seven volumes (Paris 1876–78) under the title 'Le Livre des Rois.' Other editions of the original are by T. Macau (4 vols., Calcutta 1829) and by J. A. Vullers and S. Landauer (unfinished in 3 vols., Leyden 1877–84). Numerous translations are also in existence. There is an English abridgment with versions in prose and in rhyme by James Atkinson, 'Shāh Nāmah' (1832; cheaply reprinted in the 'Chandos Series,' New York 1886). Several versified selections are found in Robinson, 'Persian Poetry for English Readers' (privately printed; Glasgow 1883). A partly rhymed and partly unrhymed translation has been published by A. G. and E. Warner (6 vols., London 1905–12). A partial translation was made by A. Rogers (London 1907). Matthew Arnold used one of the episodes of the epic for his famous poem 'Sohrab and Rustum' (1853). An Italian prose rendering, the only entirely complete translation, has been made by Italo Pizzi 'Firdusi, Il Libro dei Rei' (8 vols., Turin 1886–89); and Pizzi has given extensive metrical renderings in his 'Storia della Poesia Persiana' (Turin 1894). In German there is a running paraphrase of the story by Görres, 'Heldenbuch von Iran' (2 vols., Berlin 1820). Spirited renderings of selections have also appeared in German; by A. F. von Schack, 'Heldensagen des Firdusi' (3 vols., Stuttgart 1877); and by Rückert (unfinished), 'Firdosi's Königsbuch Schahname' (ed. Bayer, 3 vols., Berlin 1890–95). Of the 'Yusuf and Zulikha' there is a complete German translation into rhymed verse by O. Schlechta-Wssehrd, 'Jussuf und Suleicha' (Vienna 1889). A critical edition of this poem has been published by H. Ethé (Oxford 1908). The latter also published some fragments of Firdausi's lyric poems with German translations (in Kgl. Bayer. Akad. der Wissenschaften, *Sitzungsberichte der Philosophisch-Philologischen und Historischen Classe,* Vol. II, p. 275, Munich 1872). Consult Browne, E. G., 'A Literary History of Persia' (2 vols., London 1902–06); Ethé, H., 'Neupersische Litteratur' (in 'Grundriss der Iranischen Philologie,' Vol. II, p. 130, Strassburg 1896–1904); Guerber, H. A., 'Book of the Epic' (Philadelphia 1913); Horn, P., 'Geschichte der Persischen Litteratur' (Leipzig 1901); Nöldeke, T., 'Das Iranische Nationalepos' (in 'Grundriss der Iranischen Philologie,' Vol. II, p. 212, Strassburg 1896–1904); Pickering, C. J., 'Lyrical Poetry of Firdausi' (in *National Review,* Vol. XIV, p. 798, London 1889–90); Robinson, S., 'Sketch of the Life and Writings of Ferdusi' (London 1876).

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FIRE, the agent of purification; one of the so-called four elements which burns, inflames, warms or heats; the igneous principle; heat and light, emanating visibly, perceptibly and simultaneously from any body; caloric; the effect of combustion. The terrific energy of fire, the most important agent of civilization, the similarity of its effects with that of the sun, its intimate connection with light, its terrible and yet genial power, and the beauty of its changeful flame, easily account for the reverence in which it was held in ancient times. At a period when cause and effect, form and essence, were not distinctly separated, fire became an object of religious veneration, a distinguished element in mythology, an expressive symbol in poetry, and an important agent in the systems of cosmogony. It gained a place among the elements, and for a long time was believed to be a constituent part in the composition of all bodies. At a later period, fire, under the name of phlogiston, was considered to be the source of all chemical action. See COMBUSTION; HEAT.

FIRE, Saint Anthony's. See ERYSIPELAS.

FIRE ALARM, a system of signals for announcing the location of a newly-discovered fire and summoning fire-fighters to extinguish it. In cities, what is known as the municipal type of fire alarm is in use. It is a highly organized telegraphic system, partly automatic. The signal boxes are located at convenient points throughout the city, close enough together so that no one wishing to send in an alarm has far to go to reach a box. In New York city the farthest distance to be traveled is 400 feet. These signal boxes are connected with wire circuits or loops which pass through fire department headquarters. Here the alarm is received and repeated mechanically or by hand to the fire companies detailed to protect that particular locality.

When an alarm is to be sent, the outer door of the signal box is opened (as provided), and in some boxes a tell-tale bell rings to notify the bystanders or a nearby policeman that the box is being used. This is to prevent the mischievous use of the box. On the inner door is a hook or handle which, being pulled down, releases a mechanism operated by clock-work, setting in motion a disc wheel having notches cut in its rim. The notches operate a lever key which makes and breaks contact as with a telegraph key. The number and spacing of these notches determines the signal reaching headquarters. Here a gong strikes the number of the box several times at the same moment, printing on a recording telegraph instrument dashes in accordance with the notches on the dispatching wheel in the signal box; thus, — ——— ———— represents box 134. Upon receipt of this signal the operator takes from its case a disc bearing the same number of notches, slips it into the dispatch box of the fire-house circuit and releases the mechanism; or he may send it by hand with a telegraph key, or, if either of these lines is out of order, he may use the telephone. The signal may go to all the engine houses in the city or it may go only to the companies who are to go to that particular fire. At the engine house the signal sounds twice on a small bell and once on a big gong located on different circuits, so as to provide against a chance breakdown of one or the other circuit. The time which elapses between the pull of the box and the last stroke of the big gong in the engine house averages in New York city 50 seconds, and the engine is generally out of the house and on its way to the fire before the big gong has ceased sounding.

The signal boxes are connected in series on the circuit, the approved number for one circuit being from 7 to 10. In a large city the number of these loops becomes very large and consumes a great deal of wire, which must be kept in repair, and it has been the custom to place as many as 50 boxes on a single circuit. In one case now remedied there were 94 boxes on one circuit. With the regular type boxes it was quite possible for two boxes to be pulled at the same moment and the signals be confused at headquarters. The more boxes on a circuit, the more chance of such confusion, so that «succession» boxes have been installed in some cities. These boxes hold their signals by means of a special magnet as long as the circuit is being used to transmit another alarm, the armature dropping and releasing the automatic mechanism when the regular current is restored. By this device alarms from any number of boxes on a given circuit will go in to headquarters consecutively.

In towns where there is no paid fire department, and the fire-fighting force is composed of volunteers, the box alarms are arranged to be struck automatically on a large fire-bell, or the same mechanism may be made to blow a fire-whistle.

Private fire alarms — those protecting large or small private factory plants — are usually arranged in the same way as for towns, with the addition in most cases of a fire-detecting system. The latter consists of a series of thermostats placed in every enclosure, including closets, at suitable distances apart in the building to be protected. In the event of fire the thermostat, through making or breaking of electrical contact (according to its pattern), sends its alarm to an alarm box which automatically rings a fire-bell or blows a fire-whistle. Or it may go simply to a watchman's office, whence the general alarm is given by hand.

The thermostat system is used also in schools and other buildings, and in cities may be made to connect with a trip-box which sets off the alarm in the nearest street signal box.

The chief improvement in fire alarm systems in recent years have been, besides the succession box, the speeding up of the strokes of the alarm from an interval of two seconds apart to one second. This cuts in two the time required to receive and to transmit any given alarm. An addition has been made to the signal-box mechanism, affording telephone communication with headquarters, and also patrol and ambulance calls. The electric current is now furnished by storage batteries instead of cell-batteries, affording a constancy of current formerly unknown. In the larger cities the fire alarm wires have been placed in underground conduits, thus avoiding accidents to the system from falling poles.

FIRE-BACK, or **MACCARTNEY COCK**, any of the small Malayan pheasants of the genus *Acomus*, or of the Indo-Chinese genus *Lophiura*, in which the plumage of the back or rump displays glowing metallic reds. The rest of the plumage is very gorgeous, especially in the cocks, which, in *Lophiura*, are adorned with a magnificent crest. See PHEASANT.

FIRE-BALLOON, a balloon whose ascensional power is derived from a body of heated air rising from a fire beneath the open mouth of the bag.

FIRE-BALLS, (1) Balls filled with powder or other combustibles, intended to be thrown among enemies, and to injure them by explosion, or to set fire to their works. (2) A popular name applied to a certain class of meteors which exhibit themselves as globular masses of light moving with great velocity, and not unfrequently passing unbroken across the sky until lost in the horizon. They differ from ordinary meteors, probably more in volume and brilliancy than in any other distinctive characteristic. They are not to be confounded with another class of meteors, that explode in their passage and appear to let fall a dull-red body (meteorolite) to the earth. See METEOROLOGY.

FIRE-BAR, a grate bar in a furnace resting on a frame, called the fire-bar frame; inside the fire box in a locomotive engine, wedge-shaped iron bars fitted to the fire box with the thick side uppermost, to support the fire; the ends rest on a frame; they are inclined inward, with an air space between each, to promote combustion, and are jointed at one end, and supported by a rod at the other, so that the rod being withdrawn, the bars fall, and the fire box is emptied.

FIRE-BELLIED FROG. See FIRE-TOAD.

FIRE BLIGHT, or **PEAR BLIGHT**, a bacterial disease of trees of the Pomidæ, including apples, pears, etc. The prime cause is the *Bacillus amylovorus*, which enters the blossoms and gradually works down to the leaves, twigs and trunk, killing the parts as it goes. Bees and insects spread the bacilus during the time the trees are in blossom. The best method of eradicating the disease is to cut out and burn all affected parts during the late fall and winter when the trees are dormant. Care must be taken to prune off well beyond the affected limb and the trees must be carefully watched the following season, when all limbs that appear to bear the infection should be cut and burned. The disease is common throughout the United States but is almost unknown in Europe.

FIRE BOAT. The great desirability, not to say necessity for facilities of fighting water-front fires from their water side led at first to the placing of fire engines on scows and towing them into position. From this primitive makeshift has developed the highly organized modern fire boat with an efficiency surpassing a dozen land engines, to be found in all cities possessing water frontage to be protected.

The first requirement of a fireboat is speedy movement. It must get quickly to the fire. For this its propelling engines must be powerful beyond the ordinary. In addition to power it must be able to manœuvre swiftly. Its streams of water must be thrown with much greater force than is the case with a land engine, and its pumps must therefore be of great power. To operate this mechanism a very large boiler capacity is necessary. The adjustment of all these requirements has developed a fire boat of 120 to 125 feet in length, from 25 to 28 feet molded beam, about 15 feet molded depth and with a draught of from 8 to 9½ feet and a displacement of from 450 to 500 tons. The propelling mechanism consists of twin screws of 6 feet diameter and 8 feet pitch, and give a running speed of 14 to 16 miles per hour. To save boiler space and weight the pumps are of the two-stage centrifugal type and operated by turbine engines, which require only half as much steam as reciprocating pumps. In some recently built fire boats (for Chicago) the propellers are driven by electric motors served by generators. These may be controlled direct from the pilot house without calling upon the engineer. The fuel used is generally coal, and steam sufficient to run the boat is kept up night and day. Upon receipt of a summons to a fire the fireroom hatch is closed and the blower started, producing in the fireroom the forced draught necessary to raise the steam pressure to full working capacity — from 200 to 225 pounds per square inch. In a Seattle fire boat the fuel is oil, supplied to four boilers by four burners to each.

When lying idle only one or two burners on each boiler are needed to keep up steam and the others can be instantly lighted when an alarm is received. The water delivery system is operated by two sets of pumps which take the water through 14-inch intakes at the level of the bilge of the boat, and pump it into a 12-inch or 14-inch main which encircles the vessel. The pressure exerted upon the main is from 180 pounds per square inch upward for a delivery of 9,000 to 11,000 gallons per minute. The two pumps can be compounded so as to deliver 5,000 gallons per minute at 250 to 300 pounds per square inch. The nozzles are distributed about the boat, all being connected with the main. The principal nozzles are the two monitors, one located (usually) on top of the pilot house and a second one aft. They range from 4½ to 5½ inches diameter. Besides these there are from 8 to 12 hose connections for 2½ to 3½-inch hose. In some of the newer New York fire boats there is a standpipe 27 feet in height placed near the stern of the boat. This has at its top a deck or platform from which the firemen are able to fight a fire in the second story of a pier with much greater efficiency than from the water level. Fire boats carry usually up to 1,500 feet of hose, of 2½-inch size for interior work and 3½-inch for outside work. These hose lines may be extended inshore as far as 500 feet and do effective service. The New York fire boats have also connections by which they can couple to the pipes of the high-pressure service at the water's edge, and by their powerful pumps aid in fighting fires which are far inland. Consult West, C. C., 'Centrifugal Pump Fire Boats' (in Transactions of the Society of Naval Architects and Marine Engineers, Vol. 16, pp. 211–228).

FIRE BOX. See Locomotive.

FIRE BRICK, a brick capable of sustaining, without fusion, the extreme action of fire. They are used for lining furnaces, and for all kinds of brick-work exposed to intense heat which would melt common bricks. They are made from a natural compound of silica and alumina, which, when free from lime and other fluxes, is infusible under the greatest heat to which it can be subjected. Oxide of iron, however, which is present in most clays, renders the clay fusible when the silica and alumina are nearly in equal proportions, and those fire-clays are the best in which the silica is greatly in excess over the alumina. When the alumina is in excess, broken crucibles, glass-house pots, and old fire brick, ground to powder, are substituted for the common siliceous sand used in the ordinary processes of brick making, but which, in this case, would be injurious, as having a tendency to render the clay fusible. Fire-clay being an expensive article, it is usual, when making fire brick at a distance from mines, to mix with it burnt clay, for the sake of economizing the clay and diminishing its contraction. See Brick.

FIRE BRIGADES. See Fire Protection.

FIRE CHIEF or **MARSHAL,** an officer in some of the larger American cities who has the supreme command of the fire department of the municipality, and who directs the work of extinguishing fires. He is generally clothed with large powers of discretion, and has also police authority.

FIRE-CLAY is distinguished from ordinary clay by its refractoriness and infusibility, which render it an excellent material for bricks, crucibles, glass pots, retorts and similar vessels which are to be exposed to a constant and very high temperature, at which ordinary bricks and clay vessels would fuse and become vitrified. This difference is due to the purity of fire-clay, or at least to the absence from it of iron, lime, magnesia and alkalis, in appreciable quantities. It consists of hydrated silicate of aluminum almost entirely, but may contain traces of organic matter, and of some of the bases mentioned above. Fire-clays are commonly found associated with the coal formations, and usually form a stratum immediately below the coal. It seems, indeed, to be part of the soil on which the coal vegetation flourished and died. Fire clays are generally plastic, but the United States furnishes a variety known as flint clay, which is non-plastic. In the United States fire-clay is found in the Carboniferous rocks of Pennsylvania, Missouri, Kentucky and Ohio; in the Cretaceous of New Jersey, Colorado and other States and in the Tertiary formations of the Gulf States. Flint clay, which is non-plastic, resembles flint in appearance; ganister is a refractory clay with a high percentage of silica; pot clay is used in the manufacture of glass pots and burns dense at a low red heat; fire mortar is a sandy fire clay used for making mortar to set fire bricks; retort clay is very plastic and is used in the manufacture of gas retorts. About 1,750,000 tons are produced annually in the United States and are valued at about $2,375,000. Consult Bischof, 'Die feuerfesten Thone' (Leipzig 1895), and Ries, 'Clays: Occurrence, Properties and Uses' (New York 1908). See also Clay; Coal.

FIRE-CONTROL. See Gunnery.

FIRE-DAMP, the name given by coal miners to carburetted hydrogen or marsh-gas, CH_4. It is an inflammable gas, lighter than air, and is often found in coal mines, it being one of the products of the retarded decay of plant remains. A mixture of fire-damp and air in certain proportions is highly explosive; hence many frightful disasters with great loss of life mark the history of coal mining. The lowest explosive limit is a mixture of one part marsh gas with 5½ parts of air. The explosive violence increases with the addition of air, reaching a maximum with 9½ parts air; beyond this the explosive violence decreases and with 13 parts air to 1 part gas becomes inert. *White Damp* is carbon monoxide; *Stink Damp* or sulphur gas is hydrogen sulphide; *Black Damp* is carbon dioxide. *Afterdamp* is the mixture of gases formed by an explosion. See Coal Mining; Gases, Mine; Methane; Safety-lamp.

FIRE DISTRICT. See District.

FIRE-EATERS, in United States history, the violent, swaggering and defiant Southern extremists before the War, threatening vengeance on Northern interferers with slavery or government interferers with the slave States. The name is used in a general sense for a blustering hot-head, especially a professional duelist.

FIRE ENGINE, a machine for throwing water or extinguishing chemicals upon fires. As it is commonly understood it is a portable pumping apparatus designed to throw water; but it applies equally to the so-called «chemical engine» in which no pump is needed, the necessary propelling energy being derived from chemical action within strong containers.

In their earliest form fire engines were large syringes, which were filled with water to be squirted on the fire by the united exertions of three or four men. Later they were in the form of reciprocating pumps connecting with a pressure chamber from which hose was employed to conduct the water to the place where it was needed. This idea passed through many developments, and even before the application of steam as a motive power some very efficient hand-pumping apparatus was in use, operated by a double acting rack with 25 to 30 men on a side. This machine is still in vogue in several parts of the United States, chiefly in the South and the Middle West. These early types of fire engine were, as a rule, drawn by hand. With the advent of steam as a motive power for working the fire pumps, the long familiar upright boiler with its duplex or triplex pumps came into use, and, being very heavy, was drawn by horses. The next step forward was to make them self-propelling, using their own steam to get them to the fire, and afterward to do the pumping. A great stride in efficiency was thus achieved, for the time in getting to the fire was practically cut in two, and this, in the case of a newly starting fire, meant often an enormous saving in the fire loss.

The development of the gasoline motor car led to the production of a new type of fire engine which is gradually displacing the «steamer,» both horse-drawn and self-propelling. The motor engine requires no heavy boiler, and no fire has to be kept up when the engine is waiting a call. It is ready to start on the instant, to travel to the fire at a speed of 35 miles per hour and to go instantly to work with its pumps when arrived. The same engine drives the car and operates the pumps. A favorite type with city fire companies has 6-cylinder motors of 70 horse power, with a maximum speed of 60 miles an hour, and a water delivery of 700 gallons per minute. This truck carries also 1,000 feet of 2½-inch hose and two 3-gallon chemical extinguishers, with pikes and axes, and a crew of seven men.

In many cities the steam pumping engine is still in use, the horses having been done away with by installing a motor traction drive on the front of the truck. A flash type of boiler, burning kerosene, has supplanted the coal-burner, in some cases.

In small towns the motor chemical engine has found great favor, and its success has given this type place even in large cities as «scout» engines. It has been found by experience that these small trucks are able to handle 80 per cent of all fires for which alarms are sent out. They carry a 30-gallon or 60-gallon chemical tank, 150 feet of chemical hose, an extension ladder of 24 feet and a roof ladder of 12 feet. They are easily operated by a crew of three men or by two in case of emergency. In some cities they are scattered all about the protected area, and are depended on for quick work.

The saving of motor-driven engines over horses varies from $160 to $200 per year for each horse displaced, and even the first cost of motor apparatus is somewhat lower than the older types. The motor engine will take care of three times the area that can be covered by the horse-drawn engine, and entirely outclasses the latter in deep snow or on muddy roads in the suburbs.

The chemical engine, motor-driven, is coming more and more into favor. The damage done by water in this case is but a small fraction of that done by the large water pumps, and the low first cost makes them available even for the smallest towns. A novel outfit of this type is mounted on a sea-plane, and forms part of the fire equipment of the city of San Diego, Cal. It flies to the fire at a speed of 75 miles an hour with its crew of two men besides the pilot. It is intended only for use on water-front fires, as it must «land» on the water.

Another special type of fire engine is in use on Canadian railways. A 10,000-gallon tank is built upon a flat-car and equipped with a pump operated by the train-heating apparatus of the locomotive which draws it. The pump is powerful enough to throw two one-inch streams to a distance of 200 feet from the car without stretching hose.

FIRE-ESCAPE, the name applied to any means of escape from a burning building. Many suggestions have been made for contriving the means of effecting this, some of them being for apparatus to be used in the interior of a building, and some to be used from without. Of the contrivances to be used within a building the simplest are a rope firmly attached to something near a window, or a rope sliding over a pulley fixed to the window-sill, and the like. And of the different machines that have been made for use from without, that which is found to be the most useful is the one invented by Wivell, and consists of a wheel-carriage supporting a long ladder with a net underneath. The ladder consists of extensions, the main ladder and the upper ladders, the upper folding over the main ladder. When used the ladder is set to the window of a building which is burning; the attendant mounts it, and assists those who are in danger to descend it.

FIRE-EXTINGUISHER, an apparatus for extinguishing fire. It is charged with water and a mixture of dried ferrocyanide of potassium, sugar and chlorate of potassa. It is set in action by a blow on a glass bottle containing sulphuric acid, which flows over the charge and liberates gas, which, with the water, is emitted at a nozzle and expended upon a fire to quench it. The earliest of modern fire-extinguishers seems to have been that invented by W. A. Graham, of Virginia, about 1837. It consisted essentially of a contrivance by means of which carbonic acid gas dissolved in water under pressure could be liberated and directed upon burning objects. Many subsequent improvements have made Graham's fire-extinguisher more useful. In the upper part of the cylinder a glass receptacle is placed, containing sulphuric acid and closed with a loosely fitting stopper. When in use the cylinder is inverted, the stopper drops out and the acid mixes with a solution of carbonate of soda. Carbon dioxide is generated instantly and produces considerable pressure, forcing the liquid through a flexible nozzle which is directed on the fire. The Babcock extinguisher consists of a vessel filled with a solution of bicarbonate of soda. In the upper part of the vessel there is a smaller one containing sulphuric acid, suspended by pivots below its centre. When not in use this inner vessel is kept upright by a rod passing through the stopper of the larger vessel, but in case of fire the rod is withdrawn, thus permitting the inner vessel to topple over and mingle its contents with the bicarbonate of soda. The result, of course, is that carbonic acid gas is at once liberated. Many automatic fire-extinguishers, intended to be brought into operation by the rise of temperature caused by fire, have been used with more or less satisfactory results. The best known of these are the sprinkler systems, in which water pipes are laid to every room of a building, and in each room is placed a nozzle held closed by an easily fusible metal. When the temperature rises to the danger point, the metal melts, opening the nozzle and water at high pressure is released in the room. Extinguishers charged with chloroform or carbon tetrachloride mixtures are used in fires caused by electric currents as these solutions are non-conductors.

FIRE-FLIES, any of various forms of nocturnal insects belonging to different orders having the power of voluntary self-luminosity, usually more or less intermittent and exhibited in flashes. After the death of the insects the luminous segments, at least in many forms, can be distinguished by their paler usually yellow color which contrasts with the darker color of the remainder of the insect. The true fire-flies, commonly termed also «lightning bugs,» are found in the family *Lampyridæ,* and particularly in the genus *Photinus.* Throughout a considerable portion of our country, including the District of Columbia and vicinity, *P. pyralis* is the most prominent form of fire-fly. Farther north *Pyractomena borealis* and related species are the more common fire-flies, while a large species, *Photuris pennsylvanica,* extends from north to south. One of the most remarkable forms of fire-flies is found in the genus *Phengodes,* in which the females are wingless and larviform; the males are not luminous. The historic and poetic «glow-worm» is the wingless female of the European *Lampyris noctiluca.* In America the glow-worms are scarce, and are usually the larvæ of the genera which have been mentioned, most of which are luminous in both sexes. In other countries various other insects are reported to have the power of luminosity, among which are the lantern-flies of South America (*Fulgora lanterneria* and *candelaria*). The luminous power of the lantern-fly, however, is doubted. In Central America and the West Indies and in South America the most abundant fire-flies belong to the genus *Pyrophorus,* large snapping-beetles (*Elateridæ*), in which the luminous portions of the body are on the sides of the thorax in the form of two large pale eye-like spots. Numerous other forms of insects, including another genus of *Elateridæ,* an Asiatic buprestid beetle, some forms of poduras, the maggots of certain flies, especially of the fungus gnats (*Mycetophilidæ*), are luminous; but next after the *Lampyridæ* perhaps the myriapods are most remarkable for the possession of this power of self-illumination. The luminous or photogenic organ is regarded by Wielowiejsky and also by Emery «as morphologically a specialized portion of the fat-body, being a plate consisting of polygonal cells, situated directly under the integument, and supplied with nerves and fine tracheal branches»; while Lang, in writing of the physiology of insect-phosphorescence, briefly states that «the cells of this luminous organ secrete, under the control of the nervous system, a substance which is burnt during the appearance of the light; this combustion takes place by means of the oxygen conveyed to the cells of the luminous body by the tracheæ, which branch profusely in it and break up into capillaries.» Emery, writing of the luminosity of females of *Luciola,* states that its use appears to be a means of defense, a warning or danger signal against insectivorous animals, but there is little doubt that it also serves to attract the sexes, especially in the case of the wingless females whose powers of locomotion are so limited, while the males fly freely. Prof. S. P. Langley, secretary of the Smithsonian Institution, has made considerable study of the «cucujo» or *Pyrophorus,* as has also Heinemann, the latter reaching the conclusion that the light depends on a process of oxidation. The cucujos are the most interesting of all the fire-flies, and they are much used by the South and Central Americans in furnishing amusement for the children, while the ladies employ them as ornaments for their evening toilet, fastening great numbers of them to their ball dresses.

The literature of this subject is very extensive; a list of important articles compiled by A. S. Packard may be found in the ‹Journal of the New York Entomological Society› (Vol. IV, 1896).

FIRE-INSURANCE. Loss through fire constitutes one of the great hazards confronting society to-day, and the scientific conduct of business requires that some organized method for the elimination of this risk be used by property owners. Three methods of elimination may be employed, viz.: (1) the adoption of measures designed to prevent the origin and spread of fire; (2) so-called self-insurance, designed to enable the property owner to carry the risk himself; and (3) insurance, as commonly understood, whereby for a definite consideration, called the premium, the risk of loss is transferred to some other person or group of persons called the insurer. While all the foregoing methods are employed extensively to-day, it should be stated that self-insurance can be used safely and scientifically only by corporations or individuals whose property consists of a sufficiently large number of separate units so widely distributed and so nearly equal in value as to make the application of the law of average possible and to render negligible the conflagration hazard. It is for this reason that many large corporations, while carrying most of their insurance in a self-insurance fund, nevertheless insure the more costly items of their property with insurance companies. Moreover, should self-insurance become possible in a given business, it is important that the transition from a system of insurance by companies to a plan of self-insurance should be gradual.

Statistics clearly indicate that self-insurance has its serious limitations and that with every succeeding decade a larger proportion of the nation's wealth, subject to destruction by fire, is being protected by insurance with regular insurance companies. In other words, less and less of the fire hazard is assumed by capital itself, and an increasing reliance is being placed upon insurance and fire prevention, the latter serving the purpose of reducing the cost of fire insurance rather than in eliminating the need for insurance itself. From an average of $6,394,000,000 of insurance carried by American and foreign companies in the United States during the years 1877–80, the total outstanding risks carried by these companies increased to an average of $10,992,000,000 during 1881–90, to $18,368,000,000 during 1891–1900, to $31,924,000,000 during 1901–10, to $46,276,000,000 in 1911, and to over $63,000,000,000 in 1916. Since 1900 the average rate per $100 of risk carried also shows a very appreciable decline, namely, from $1.1116 to $.9915, or approximately 10 per cent, and this despite the fact that the period under consideration has been noteworthy for a material rise in prices along nearly all lines. In the meantime the companies have greatly increased their financial strength. Thus, as regards the joint-stock fire insurance companies licensed in New York State, and writing probably 80 to 90 per cent of the nation's fire insurance, it appears that during the half century between 1867–1917 (with approximately the same number of companies operating) the capital has more than doubled, the assets have increased by nearly 860 per cent, while the net surplus is larger by about 22 times.

OUTSTANDING RISKS OF AMERICAN AND FOREIGN COMPANIES TRANSACTING BUSINESS IN THE UNITED STATES

(Compiled in the 1917 *Insurance Year Book*)

YEAR	Amount covered	Premiums charged*	Rate on $100
1877–1880.....	$25,575,178,350	$246,116,917	.9623
1881–1890.....	109,928,038,845	1,137,444,741	1.0347
1891–1900.....	183,680,184,497	1,905,280,004	1.0373
1901–1910.....	319,237,036,712	3,548,853,251	1.1116
1911..........	46,276,992,650	491,072,474	1.0612
1912..........	48,840,386,151	514,594,534	1.0536
1913..........	52,856,280,672	544,836,753	1.0308
1914..........	56,012,859,329	570,687,566	1.0189
1915..........	58,867,095,439	588,701,918	1.0000
1916..........	63,355,299,583	628,209,683	.9915

* Gross less reinsurance.

Briefly outlined, the history of fire insurance in the United States divides itself into four distinct periods, viz.: (1) the pioneering stage, ending with the New York fire of 1835; (2) the period from 1835 to the close of the Civil War; (3) the period from 1866 to 1880; and (4) the years from 1880 to the present.

During the first period fire underwriting was largely of a personal or partnership character, the interested parties being usually leading merchants in the principal manufacturing and mercantile cities. The Philadelphia Contributionship, in many respects patterned after the Hand-In-Hand of London (established toward the close of the 17th century), was organized on 13 April 1752, and was the first fire insurance company to be established in the United States. This effort at corporate underwriting was followed by the establishment of the Mutual Assurance Company in 1784, the Knickerbocker Fire in 1787, the Baltimore Equitable Society and the Insurance Company of North America in 1794, the Mutual Assurance Company of the city of Norwich in 1795, the Columbian Insurance Company in 1801 and the Hartford Insurance Company in 1803. It is noteworthy that the first two companies mentioned are still in existence and still continue their original plan of issuing so-called perpetual policies. By 1820 some 28 stock companies had been established, of which 17 were located in New York, 6 in Pennsylvania, 2 in Connecticut and 1 each in Rhode Island, New Jersey and Massachusetts. With few exceptions, the companies of this period were purely local in character and seldom transacted business outside of the cities where they were located. Most of the companies also transacted both fire and marine insurance, many placing greatest emphasis upon the latter. The contracts issued usually furnished no security beyond current receipts and the good faith of the men behind the companies. Foreign companies, it should also be added, were generally forbidden to transact business in this country, a policy continued in certain States even after 1835. The New York conflagration of 1835 proved the undoing of most of the New York stock companies, and thus served to pave the way toward the elimination of many serious shortcomings in the business. Not only did the leading companies begin a policy of classifying risks and of treating the conflagration hazard with some sort of scientific consideration, but a greatly increased emphasis was placed upon the necessity for

FINANCIAL STRENGTH AND VOLUME OF BUSINESS TRANSACTED BY JOINT-STOCK FIRE INSURANCE COMPANIES* LICENSED IN NEW YORK STATE

(Compiled in *The Spectator*, 23 May 1918)

YEAR ENDED 31 DECEMBER	Number of companies	Capital	Assets	Net surplus	Net premiums	Losses paid	Ratio of losses to premiums
							Per cent
1917..............	186	$106,238,990†	$825,275,667	$231,866,309‡	$506,114,518	$239,249,320	47.3
1867..............	170	48,158,390†	86,035,408	10,193,086‡	44,478,173	27,300,264	61.3
Increase.....	16	$58,080,600	$739,240,259	$221,673,223	$461,636,345	$211,949,056	....

* Includes inland and ocean marine risks of certain companies which could not be separated from their fire insurance business.

† Capital of American companies only.

‡ Includes surplus as to policyholders of United States branches of foreign fire insurance companies.

making proper provision for the financial stability of companies. Thus Massachusetts, in 1837, provided that companies should maintain a fund to insure contracts; while New York, in 1853, followed with a reserve law. Such statutory acts constituted the beginning of what are known as reserve or unearned premium fund laws, to be found at present on the statute books of nearly every State, and also marked the entrance of the State into the field of fire insurance, a movement which was subsequently to become of much greater importance. Despite such legislation, however, fire insurance companies generally continued to pursue a policy throughout this period of keeping up dividend payments at the expense of an adequate surplus. In fact it was not until after the Chicago and Boston conflagrations that the companies came to a full realization of the necessity and duty of maintaining a large working surplus. Practically all the companies also continued at this time to devise their own policy contracts, and little effort was apparently made to give to the business community the benefits of the greater certainty and fairness resulting from the mandatory use of a well-constructed standard policy by all underwriters.

Two other main features marked the development of the fire insurance business during this second period, viz., the development of the mutual idea, and the employment of special agents. The great majority of New York companies having been wiped out by the New York conflagration, it was only natural, as a result of great distrust against stock companies, that one of the so-called «mutual waves,» to which the fire insurance business has been subject from time to time, should sweep over the country. The extent of the movement may be inferred from the fact that no fewer than 62 of these concerns reported to the comptroller of New York by 1853. Most of these concerns, however, were organized on incorrect principles, and operated over too large an area and upon too small a capital to assure the safeguards necessary to mutual insurance, with the result that the whole idea soon proved unsatisfactory and became highly discredited. The stock companies, on the other hand, took advantage of the opening of the West, and began to spread their business beyond their immediate home localities. Such a movement naturally required greater dependence upon field representatives; hence we find the companies employing special agents, or field men. But the function of these representatives, unlike the later practice, was still limited mainly to the adjustment of losses.

With the close of the Civil War the business entered, for the first time, into a period of co-operation. In 1866 the leading companies of the country organized the National Board of Fire Underwriters for the purpose of securing adequate rates and uniformity in the use of proper forms and the handling of all matters of common interest. This event probably marked the most important change that had thus far occurred in a business so essentially co-operative in character. Other events during this period, however, also serve to show the increasing tendency to place the business on a scientific foundation. Thus the daily report system came into general use in place of the so-called monthly statement. Local representatives were thus entrusted with much greater responsibility, since they were required in the preparation of their daily reports to pass upon the business accepted by the home offices. As a consequence a better class of men was needed in the field. It therefore followed, in turn, that the functions of special agents, formerly limited to the adjustment of losses, were now greatly enlarged and extended to the appointment of new agents, the examination of important risks, and the supervision of agency accounts and methods. Incompleteness in the information of risks as furnished by the field men in their daily reports also led to the use of fire maps, a feature to be later universally adopted by companies for all the larger towns and cities.

Unfortunately, the spirit of co-operation, referred to above, was rudely checked by the great Chicago and Boston fires. So many companies were destroyed by these conflagrations and so many others weakened financially that the business of fire insurance was forced into a period of utmost demoralization, especially from 1874 to 1880. Not only were numerous irresponsible companies formed, but to aggravate the situation the National Board of Fire Underwriters discontinued the making of rates in 1877 and relegated this all-important function back to the local boards. Competition in rates now became the order of the day, with the result that adequate rates could no longer be maintained. With cut-throat competition holding supreme, profits soon disappeared for most companies and only the fittest found it possible to survive. Such disintegration of the fire insurance business, so inherently co-operative in character, could not long continue, and with the beginning of 1880 (this date marking the start of our last epoch) we witness a renewed effort at co-operation. Thus in rapid succession we had the organization of the Western Union in 1879, the Underwriters Association of the Middle Department in 1881, the Southeastern Tariff Association and the Illinois State Board of Fire Underwriters in 1882, and the Underwriters' Association of New York State and the New England Insurance Exchange in 1883. Upon these and numerous other associations fell the important work of rate-making, of readjusting the numerous local boards, of applying scientific principles to the business, of unifying forms and practices, and of inculcating education along insurance and fire prevention methods. Space limits make impossible a discussion of all the important changes that have occurred in the fire insurance business during the last few decades. The following changes, however, constitute so vital a place in the fire insurance business of to-day that somewhat more than passing mention is justified. Briefly described, they are:

(1) **The Adoption of a Standard Policy.** — When all companies used their own policy forms, sometimes designed purposely to limit their liability, there was bound to be much doubt and litigation. The advantages of a carefully worded contract, mandatory upon all companies, are so apparent that one wonders why the matter was delayed until 1873 when Massachusetts provided a standard contract and later, in 1880, made it obligatory upon all com-

panies doing business in the State. In 1886 New York adopted a standard contract (made mandatory in January 1887) which subsequently became the law, with slight changes here and there, in numerous other States. Recently the original New York contract has been revised in New York and various other leading States, and at present it may be said that a standard contract is in general use throughout the country. Since certain States require the use of a standard by all companies, it follows that these companies find it convenient to use the same contract elsewhere although no statute may prescribe a standard. Through the operation of underwriters' associations a remarkable uniformity has also been developed in the use of standard clauses and riders.

(2) **Schedule Rating.**—As properties became more complex in character, it necessarily followed that accuracy and justice in rate-making required a departure from the old method of arriving at a rate through personal judgment. Accordingly we have the adoption of rating by schedule, a system which makes possible the scientific determination of rates by taking into account the numerous factors that must necessarily enter, such as the good and bad features of the locality, the good and bad features of construction, the presence or absence of fire appliances, the occupancy, exposure and management of the risk, and the presence or absence of coinsurance, adverse legislation, etc. Such a procedure gives, among other things, the advantages of greater accuracy in rate-making and greater equity between different property owners as well as communities. It also encourages proper construction and the installation of fire preventive appliances, tends to lessen discrimination between different classes of risks, exerts a salutary effect in reducing unwholesome competition and cutting of rates, and discourages the enactment of so-called anti-compact laws.

In 1893 F. C. Moore and various associates promulgated the “Universal Mercantile Schedule,” and in the late 90's A. F. Dean prepared his so-called “Mercantile Tariff and Exposure Formula for the Measurement of Fire Hazards.” These two schedules, or modified forms thereof, soon became the prevailing basis for rates in the United States, the Universal Mercantile Schedule being adopted most generally in the East and the Dean Schedule winning greatest favor in the West. Both schedules, however, are still “judgment systems” in that they represent collective estimates rather than actual experience. They represent, however, a decided improvement over the old system based on individual judgment. Within the last few years a further development is occurring in the direction of rate-making on the basis of actual experience. The most important step thus far in this direction has been the formulation by E. G. Richards of the “Experience Grading and Rating Schedule,” or the so-called “E. G. R. Schedule.” While not in actual use as yet, this proposed schedule has been the subject of much discussion and would seem to indicate that actual experience will soon, as far as it is possible to do so, figure prominently in fire rating systems.

(3) **Improved Inspection Systems.**— On the theory that the prevention of fires is cheaper than the payment of losses, numerous so-called factory mutuals developed exceedingly efficient systems of inspections and fire preventive appliances. The competition that resulted from such methods had to be met by the stock companies. Accordingly, they were forced to create organizations (such as the Factory Insurance Association organized in 1890) which would specialize in the inspection of special properties and the writing of large policies upon protected risks. Moreover, the companies also began to participate actively in the spread of fire preventive methods, especially through their national associations, by enlisting the cooperation of manufacturers, architects, chemists and civic organizations, and by creating a special laboratory for the testing of new appliances and processes designed to cut down the fire waste. Loss adjustments also came in for decided improvement. Not only were special organizations created for the adjustment of losses, whereby companies unwilling to have special agents for the purpose were enabled to secure the services of trained experts, but special corporations or company organizations were created for the salvaging of damaged goods.

(4) **General Use of Coinsurance.**—Although resisted in various States through the adoption of so-called anti-coinsurance laws, the fire insurance companies of the country have succeeded in enforcing the use of coinsurance in one form or another. Briefly defined, coinsurance means that the insured shall have “any loss paid in the proportion that the insurance carried bears to the insurance required.” Usually the amount of insurance required is 80 per cent of the value of the property insured, but any other percentage may be used, depending upon the extent to which the property is considered subject to destruction by fire. In other words the insured agrees to maintain his insurance to at least a certain specified percentage, but in case it proves to be less it is understood that the insured shall be regarded as a self-insurer for the deficit. Violation of the agreement does not invalidate the insurance, but instead places the insured in the position of being coinsurer with the insurance company.

It is remarkable, indeed, that recognition of the justice of coinsurance should have been so long deferred and that the practice should have been so violently resisted, particularly in the form of anti-coinsurance laws. Not only is coinsurance necessary to enable the companies to secure an adequate income, but, from the standpoint of the public, fire insurance must be regarded as a community affair. Fire insurance premiums constitute a tax on the community and each property owner should be asked to contribute his proper share to the total fire insurance fund. Moreover, coinsurance protects small property owners against large owners whose property may consist of various items, so scattered as to render each a separate risk. Thus, if large corporations, for example, were not compelled to insure their total property to a certain percentage of the value (thus being compelled to pay premiums in the same proportion) they could secure full protection by simply taking out a blanket policy for an amount equal to the value of the largest item. The coinsurance principle is also necessary in the rating of fire-proof risks where manifestly the rate per $100 of insurance should decrease as the proportion of the risk insured increases.

It may be added that, in view of the difficulty of using the coinsurance clause in certain localities, particularly where anti-coinsurance laws exist, companies frequently use the so-called graded rate system. Mathematically the graded rate system (under which, in view of a higher premium rate, the property owner is promised all losses in full) and the use of the coinsurance clause (under which property owners paying the same premium are promised payment of their losses only in the proportion that the insurance carried bears to the insurance required) can be made to approximately equal each other.

(5) **Co-operation through Underwriters' Associations.**— Success in the use of standard forms, the maintenance of adequate and scientifically made rates, and the enforcement of just principles and practices requires a high degree of co-operation between the numerous companies operating throughout the country. This united action has been attained chiefly through the medium of so-called underwriters' associations, and at present there are few of the regular stock companies that are not subject to, and there is scarcely a section of the country that does not fall within, the jurisdiction of some association. Classified according to territory covered, the various underwriters' organizations (designated under the various names of "association," "union" or "exchange") may be divided into (1) *Local* (urban or suburban), such as the New York Fire Insurance Exchange and the Philadelphia Underwriters' Association; (2) *Sectional,* such as the Eastern Union, the Western Union, the Department of the Middle States, the Underwriters' Association of New York State, the New England Fire Insurance Exchange, the South Eastern Tariff Association, the Rocky Mountain Fire Underwriters' Association and the Underwriters' Association of the Pacific, and (3) *National,* such as the National Fire Underwriters' Association and the National Fire Protection Association. Since most of the leading companies transact business in different sections of the country, it follows that they hold membership and exert their influence in various associations. Consequently there has developed a tendency toward uniformity of practices throughout the country, unless local conditions dictate otherwise.

The *local* and *sectional* associations occupy themselves largely with the more practical and operating phases of the fire insurance business. Their activity relates chiefly to the maintenance of survey and inspection departments, the making of rates, schedules and standards which shall be binding on all members, the regulation of brokers' and agents' commissions, the standardization of long and short-term rates, the adoption of clauses and endorsements, the elimination of objectional practices, such as rebating and rate-cutting, the expulsion of undesirable members and the securing of the benefits of mutual council and assistance. The national associations, on the other hand, concern themselves primarily with matters that may be described as technical and educational. Most of their work is performed through special committees. Briefly summarized, the principal services rendered thus far have been the following:

(1) Education of the public in the protective value of fire insurance. (2) Lowering of expenses, particularly in the reduction of arson and incendiarism and the elimination of unjust and unwise legislation. (3) Comparison of company data and the compilation and publication of statistical experience. (4) Inspection of the protective facilities of cities and towns and the suggestion of improvements. (5) Preparations of standards for the installation of lighting and heating devices. (6) Formulation of correct building codes. (7) Improvement in the methods of adjusting losses. (8) Adoption of a standard fire policy and the formulation of standard clauses. (9) Testing and inspection of fire preventive and protective devices of all sorts and the establishment of efficiency standards in connection therewith.

(6) **State Regulation.**— Legislation affects fire insurance at so many points that almost every phase of the business may be said to be regulated. The earliest legislation concerned itself chiefly with the organization and financing of companies, the supervision of agents, brokers and officials, the prohibition of discrimination and the establishment of reserve standards. Later the legislatures saw fit to adopt laws designed to compel the companies to pursue a certain course of action, and this type of legislation proved for the most part to be inimicable to the best interests of the business. Four such types of legislation, all of an adverse character, deserve mention, viz.: (1) anti-coinsurance laws; (2) valued policy laws which, in the case of a total building loss, compelled the company to settle for the full face value of the policy, although the actual loss suffered might be less; (3) retaliatory laws which aimed to place the State passing the same in such a position of preparedness that it might promptly retaliate upon the companies of another State whenever that State saw fit to inflict harsh measures upon foreign companies doing business within its borders; and (4) so-called anti-compact laws which sought to prevent companies from joining underwriters' associations of any kind and thus gave expression to the current incorrect belief that open competition was the life of trade and that co-operation was unnecessary and indicative of collusion for purposes of extortion and unfair treatment. As time went on, and financial needs increased, the States also took full advantage of their taxing power, with the result that heavy taxation, frequently imposed without any reference to the profits realized from indemnities, has become one of the most serious problems confronting the business. In recent years some States, like Texas, Kansas, Nebraska, Louisiana, Kentucky and South Carolina, also saw fit to bring the subject of rating under their immediate control, either through a commission or department appointed for the purpose. Fire insurance, however, cannot be said to have State limits. The subject is also so highly technical in character and so dependent upon the national experience of the companies that it is questionable whether State-made rates will ever be accepted as a solution of the rating problem. Both the Illinois and New York Commissions appointed for an investigation of the subject reported to this effect in 1911. The tendency just now seems to be in favor of rate regulation rather than rate fixing. Several leading States, including New

York and Pennsylvania, have already passed laws which permit rating organizations to exist and which leave with them the fixing of rates. But this power is not given free from restrictions. Instead, underwriters' associations are brought under the full regulatory control of the State, and all discrimination against companies or property owners is prohibited. Moreover, full publicity is required as regards all plans and methods in arriving at any property owner's rate, the State reserving power to order such changes as may be deemed necessary.

No discussion of fire insurance would be complete without a reference to the principal types of underwriters transacting the business. Five such types of insurers (or plans of insurance) furnish practically all of the insurance in the United States to-day, viz.: (1) individual underwriting in the form of Lloyds associations; (2) assessment mutuals (township, county and State); (3) factory mutuals; (4) inter-insurer or reciprocal underwriters' associations, and (5) joint-stock companies. Individual underwriting through Lloyds associations, named after the famous Lloyds of London, is on the decline in this country and ranks as the least important of the several classes enumerated above. Although some of these organizations involve unlimited liability on the part of their members, they usually represent voluntary partnerships in which each member assumes liability only for the payment of losses up to a specified amount. The security behind the contract therefore depends chiefly upon the personal and financial standing of the members composing the partnership, although in some cases additional security exists in the form of a special guarantee fund for loss payments. It is important not to confuse American Lloyds associations with the famous London Lloyds. This latter organization also transacts a considerable volume of fire insurance in the United States and has acquired a position of the highest international reputation. While it is true that all business is assumed by the members of the organization as individuals (no responsibility being assumed by the corporation for the solvency of its members), London Lloyds presents the advantage of a well-organized institution, which limits admission to persons of recognized standing and safeguards the transactions of its members by the rigid enforcement of a strict code of rules and business honor.

Local mutuals are exceedingly numerous and transact a considerable share of the nation's total fire insurance. They were usually organized with a view to charging lower rates than those obtainable from the regular stock companies and then to provide for additional payments in case of necessity through some kind of assessment arrangement. Where their activity is limited to a restricted territory, thus enabling the members to know each other, such mutuals have demonstrated the advantages of economy and the practical elimination of the moral hazard and over-valuation. Past history, however, shows a heavy mortality among this class of companies. The reasons for this experience have usually been three, viz., restriction of the business in such a way as to make inapplicable the law of average in case several losses occur within a short space of time, inability to enforce the payment of assessments, and unscientific procedure in the determination of rates. Past experience also shows that State mutuals possess the further serious disadvantages of an increased moral hazard, due to the larger area over which they operate, and the tendency to charge inadequate rates to meet the competition of well-established stock companies. To overcome the aforementioned disadvantages, a number of legislative restrictions have been adopted with reference to local mutuals. In most instances this legislation has aimed to prohibit their operation in cities subject to a conflagration hazard, to restrict their business to risks of the non-hazardous type and to a limited area of one or a few counties, to limit the volume of insurance placed on any one risk and to require a certain volume of applications, usually from $50,000 to $200,000, before permitting the transaction of business.

As distinguished from ordinary mutuals, so-called "factory" or "mill" mutuals confine themselves to the insurance of factory properties or special types of industries, which under ordinary conditions rank among the most hazardous of risks. Like the local mutuals, this type of organization originated largely as a protest to the high rates charged by stock companies, but, unlike local mutuals, it was begun with the set purpose of making fire prevention and not insurance the primary purpose. In this respect factory mutuals soon proved a powerful competitor to the regular companies; in fact much of the progress of stock company insurance of factory risks is traceable to this competition. Like ordinary mutuals, the factory mutual plan also incorporates the assessment feature, usually to an amount equal to three to five times the gross premium. But there are very few, if any, cases on record where assessments have been levied to pay losses. Not only are redundant premiums charged with the idea of refunding the unused portion in dividends, but in the great majority of instances it has been a deliberate policy to accumulate a surplus much in excess of a total year's losses. The members of these mutuals being business men, it follows that an assessment could be easily collected if it should ever prove necessary to levy one.

As supplementing the aforementioned factors, several other essential principles are strictly observed. The installation of automatic sprinklers and the standardization of properties from the fire prevention standpoint are almost universally insisted on. Rigid inspections are also made periodically with a view to making suggestions for improvements and to terminate the insurance if recommendations are not complied with. Moreover, most of the associations have combined into reinsurance unions for the purpose of apportioning large risks over the entire membership. Combining all the aforementioned factors, it is not surprising that factory mutuals should present a remarkable record of success. It is reported that they have succeeded in bringing the average rate down to the remarkable figure of about 7 cents per $100 of insurance. The premiums charged, as already indicated, are much larger, but unused portions of the premium are returned at specified periods. During recent years it appears that many of these mutuals have regularly paid dividends equal to from 60 to 94 per cent of the premium income.

"Inter-insurer" or "reciprocal underwriters" associations resemble factory mutuals in some respects, but in others are similar to Lloyds organizations. According to this plan each insured member is also an insurer, i.e., the members become insurers of each other's property. An attorney-in-fact usually conducts the business for the association and has authority to bind each member for a certain amount on the risk of each other associate. Only selected risks, well equipped with fire preventive appliances, are accepted. Periodic inspections are also maintained, and usually the regular rates are charged with the idea of returning unused balances in the form of dividends. These associations, it may be added, originated chiefly because of the difficulty many large property owners had in procuring enough insurance from companies authorized to transact business in the particular locality.

While all of these types of underwriters are important in their respective spheres, sight should not be lost of the fact that probably over 80 per cent of the nation's total fire insurance is carried by joint-stock companies. In return for a certain premium these companies make a definite promise, and, unlike mutual concerns, do not reserve the right to collect assessments. As a rule, they operate over a large territory and therefore require a large and intricate organization. They assume all types of risks and are necessary since many classes of property are not acceptable elsewhere. Owing to the miscellaneous nature of the risks underwritten, these companies have found it necessary to use science in the determination of their rates, to organize in underwriters' associations for reasons already indicated, and to apply the most highly organized methods in both field and office. No type of underwriter is so well fitted to assume the conflagration hazard prevailing in American cities. Moreover, during the last quarter of a century American stock companies have pursued a policy of building up a large capital and surplus (over and above their legal reserve liability), thus greatly increasing the security back of their contracts.

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FIRE ISLAND, the most westerly end of a strip of the Great South Beach, Suffolk County, New York, 40 miles long, averaging one-half mile wide, off Long Island, between Great South Bay and the Atlantic Ocean. It is reached by ferry from Babylon. The beach took its name from the fires built there as signals to vessels during the war with England in 1812. Between the beach and the mainland, in Great South Bay, are five small islands. About 45 miles east of the inlet to the bay Great South Beach joins the mainland. The entire strip is dotted with popular watering-places; the air here is said to be a specific for hay fever. There is a large hotel on Fire Island Beach, and within a few rods to the east a lighthouse, 185 feet high, with a revolving white light. There is also a station from which transatlantic liners bound for New York are first sighted. Margaret Fuller Ossoli, her husband and child were drowned on this beach 19 July 1850.

FIRE LIMITS. See BUILDING LAWS; FIRE PROTECTION.

FIRE-MAKING, the art of producing fire. It was believed by the ancients that man was without fire till Prometheus stole some from the chariot of the sun, but the whole story has a mythical look. Plutarch says that in his time there were fireless races of mankind, and the geographer Pomponius Mela indicates Ethiopia as the locality of one of these. A certain Eudoxus, however, taught them how to produce it. This story cannot be tested now, but Edward Tylor, after passing in review the alleged modern instances of fireless races, rejects them one and all. He believes that there was a time when man was without fire, but it now everywhere appears to have passed away. The oldest method known of making fire is the South Sea Island one by means of a stick and a groove. There followed next, it is believed, the method of striking fire by means of a flint, a piece of iron pyrites and tinder. This process was known to the ancients, which is the reason why they called one of the two minerals used pyrites — that is, fire-stone. The Greeks, in the time of Aristophanes, knew how to concentrate the sun's rays by a burning-glass, and the Romans in the age of Pliny (23–79 A.D.) effected the same result by concave mirrors. In the case of the need-fire, a superstitious rite connected with sun worship, and of which an instance occurred near Perth as late as 1826, fire was obtained by the revolution of a windlass in the hole of an oaken post smeared with tar. The preceding generation remembered the time when fire was obtained by flint, steel, and a tinder box, till superseded by the lucifer match. Consult Hough, 'Smithsonian Report' (part II, pp. 531–587, Washington 1888); id., pp. 395–409 (ib. 1890); Tylor, 'Researches into the Early History of Mankind' (New York 1905).

FIRE MARSHAL. The concern felt in recent years in the matter of fire prevention has found concrete expression in the creation of the office of State fire marshal in two-thirds of the States of the Union and in most of the provinces of Canada. In the leading countries of Europe property owners and occupiers have long been answerable for fires on their premises, and this has tended to eliminate hazardous conditions, as have also the more substantial constructions of these older lands. In America, with much more wood construction and the absence of responsibility for damage to surrounding property, hazardous conditions have tended to increase, so that the annual loss from preventable fires has become appalling. Municipal fire marshals have for some years exercised a limited authority in controlling dangerous conditions. The office of State fire marshal, sometimes under another title and joined with some existing State department, is designed to grasp the problem of fire control in a broad way by providing for the gathering of statistics, the investigation of conditions that are hazardous, by installation of safeguards and by the spread of intelligent interest among owners and occupiers, as well as among the young through school instruction. In certain cases, the fire marshal is empowered to order the removal of sources of danger and to condemn and require demolition of buildings that are so dilapidated so to endanger neighboring property. There is no room to question that the present average yearly fire loss of nearly a quarter of a billion dollars value and much coincident loss of life can be greatly lessened by a strict supervision of property with a view to fire prevention. The fire marshals of the United States have formed an association for annual conference and the furtherance of the objects of their office.

FIRE OPAL. See OPAL.

FIRE PHILOSOPHERS, certain religionists, who in the 16th and 17th centuries attempted by the aid of fire to penetrate to the primary elements of things. They attributed little to human reason and reflection, but nearly everything to experience and divine illumination. One of the most notable among them was Jacob Boehme, a shoemaker, of Gorlitz, whom his patrons called the German theosophist. He lived in the 17th century. The others were also called theosophists.

FIRE PREVENTION deals with the avoidance of fires. In its usual application the term has reference especially to the safeguarding of buildings and their contents from destruction by fire: it applies as pertinently to preventing fires in mines, forests, etc., and is discussed in those connections under articles on such subjects.

The field in which fire prevention finds its usefulness, not to say necessity, is best outlined by the mere statement of the amount of the annual loss by fires in the United States: in the year 1914 this was calculated at $462,429,350 — which included the actual loss by fires, amounting to about $240,000,000, to which was added the cost of upkeep of fire departments and the provision of the water they used, and the excess paid for insurance above the sums returned by the insurance companies for fire losses. In European countries the fire loss is about one-tenth as much per capita as it is in the United States. With the same precaution the annual cost of fires in this country could be reduced by $300,000,000.

Obviously the study of fire prevention begins with identification of the sources of fires; for even a highly inflammable building will not burn unless it is in some way set on fire.

The fire marshal of the State of Iowa in 1914 made an exhaustive investigation into the causes of the 4,296 fires occurring in that year in his State. In the cases of 969 of these fires the cause could not be discovered. Of the remaining 3,327 the causes were as follows:

Sparks escaping from chimneys, 527; set by fires on adjoining property, 451; defective chimney flues, 375; lightning, 271; children playing with matches, 139; spontaneous combustion, 131; incendiarism, 120; carelessness with matches, 78; carelessness of smokers, 69; gasoline and oil stove explosions, 68; sparks from locomotives, 66; over-heated stoves, 64; defective electric light wires, 60; automobile backfires, 42; unprotected wood near stoves, 40; etc. It appears from this summary that aside from the two items lightning and incendiarism fully 95 per cent of the fires in which the causes could be traced were preventable, and should not have occurred. In cities the ratios of ascertained causes differs to a considerable extent. In New York City in 1916 there were 13,677 fires, of which 2,093 could not be traced to their cause. Of the remainder, 1,606 were due to smokers' carelessness; 1,573 to bonfires, brush fires and burning rubbish; 1,475 to carelessness with matches; 975 to hot coals falling from stoves and ranges and over-heated stovepipes; 824 to defective chimney flues; 772 to gaslights and redhot stoves; 757 to children playing with matches; 545 to explosion of vapors of naphtha and gasoline; 540 to defective insulation of electric wires; 515 to careless use of candles; 331 to spontaneous combustion; 286 to malicious mischief; 179 to fats igniting on the stove; 162 to lamps falling or exploding.

Primarily, of course, the foundation of efficient fire prevention is in fire-proof building, but this is a condition to be realized only step by step, and in the more or less distant future. The two most potent agencies which are available in prevailing circumstances are (1) education of the public; and (2) rigid inspection under enlightened fire laws. Marked success has been achieved in the educational line, the number of fires being largely and immediately reduced. The approved procedure is the inauguration of the campaign by lectures to children in the schools, preferably by the fire chief of the locality. This step alone served to cut down the fire loss in the State of Washington by 20 per cent. This is to be followed up by the celebration of Fire Prevention Day as an annual event. An excellent concrete illustration is presented by the city of Yonkers. In 1915 this city established a municipal fire-prevention commission, which began operations by the formation of a Fire Prevention League among the school children of the city. A battalion, made up of several patrols, was organized in each school; the parents of each boy member being required to give written consent, and with it a pledge to assist the boy in carrying out his particular duty. By this provision the interest of the whole family was aroused in the prevention idea. The first duty laid upon the boy member was the inspection of his own home, in the safeguarding of matches; the protection of all wood in close proximity to stoves and stovepipes; the elimination of accumulations of rubbish; the providing of safe receptacles for hot ashes, etc. The second duty was a public one: the «patrols» were on the constant watch for street-bonfires, dangerous rubbish piles and fire-trap conditions generally, which were reported to the nearest fire station. The movement was crystallized by a Fire Prevention Day, in which the 2,000 boys who joined the League paraded with the city fire department. Frequent meetings were held with speakers from the city fire department, and a very effective body of public opinion was developed. The practical results were immediate. The fatalities resulting from street bonfires and children playing with matches ceased entirely, and hundreds of fires were prevented and many extinguished by the watchful members of the League. With this aid alone the number of fires reported in the city annually was reduced by 50 per cent.

In the matter of building inspection by fire department officials under the law, the history of many cities gives incontrovertible evidence of its efficacy in the prevention of fires. In Massachusetts fire prevention legislation and inspection reduced the annual fire occurrence in 25 cities from an average of 400 to 100, and the annual recorded losses by $2,000,000. In 1913 the fire prevention bureau was established in the fire department of New York City. In 1912 15,633 fires were reported, with a total loss of $9,069,500. In the first year of the existence of the bureau the number of fires was less by 1,800, and the loss by $2,300,000. In the bureau's second year there were 2,600 fewer fires than in 1912, and the loss was $3,500,000 less. The bureau has a staff of about 200 officers, who inspect 70,000 buildings annually, and average 14,000 cases for fire prevention work. This is ordered by the proper authority, and its execution is attested by another inspection. The chief of the bureau has the power to order any building vacated in which the precautions ordered are not carried out; but this drastic power has never had to be utilized. See also Fireproof Construction; Fire Protection.

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FIRE PROTECTION. Statistics relating to the fire waste of America present an appalling situation, and justify the oft-repeated criticism that we, as a nation, exhibit in this respect an unusual degree of carelessness and irresponsibility. For 1917, according to the report of the National Board of Fire Underwriters, the nation's fire loss is estimated at $250,753,646. This represents a daily average loss of $686,996, and an average hourly loss of $28,624. Extending the period to 10 years the loss amounted to $2.106.558,510, an annual average of nearly $211,000,000. Since 1875 the aggregate fire loss has reached the stupendous total of $6,606,586,750. Compared with leading European cities, the American per capita loss is approximately 10 times as much; while the number of fires per thousand population shows a frequency nearly five times as great.

These figures, however, relate only to the direct fire loss and do not take into account the cost of maintaining expensive fire departments and other extinguishing facilities made necessary by the greater frequency and destructiveness of fires in this country, nor the huge indirect losses resulting from fires, such as loss of profits and demoralization of business. Direct fire losses mean an annual fire tax of about $15 per family. If the cost of fire departments and special equipment be included a similar amount can be conservatively added, thus making the annual total $30 per family. This huge waste represents an irrecoverable loss, since insurance does not serve to replace but simply shifts the distribution of fire waste. In the long run the consuming public must bear this loss in the form of increased rentals and increased prices for goods and services. The regrettable thing is that the larger part of this extraordinary waste is preventable and that it is so difficult, even in these days when conservation of resources is uppermost in the public mind, to educate the American people to change their careless and irresponsible habits in this important matter. «Preventable fire,» as President Wilson has so well said, «is more than a private misfortune; it is a public dereliction. At a time like this, of emergency and manifest necessity for the conservation of natural resources, it is more than ever a matter of deep and pressing consequence that every means should be taken to prevent this evil.»

To bring about this much desired result, greatest emphasis has been placed by fire prevention experts upon some eight leading lines of effort. It shall be our purpose to briefly present the most essential phases concerning each. Only by using all of these factors, each in proper combination with the others as circumstances justify, can preventable fire waste be reduced to a minimum.

Construction of Building.— This factor is of utmost importance in the prevention of the spread of fire after it has once obtained a good start. Various classifications of buildings from the fire prevention standpoint have been published; but the one most commonly used groups structures into four main classes, viz., ordinary, slow-burning, semi-fireproof and fireproof. Slow-burning or «mill construction» buildings are so designed as to separate the several stories by a flooring of sufficient thickness (without openings, water-proof in structure, and supported by heavy timbers resting on stout wooden posts) to confine a fire on a given floor for a considerable period despite the presence of large stocks of combustible goods. The primary purpose is to prevent the spread of fire to the stories above or below before the fire department may be reasonably certain of bringing the blaze under control.

Semi-fireproof structures, unlike the foregoing, are built of non-inflammable material, but differ from the fireproof type in not having their structural or tension metal members properly insulated against heat. They are intended chiefly for dwellings, apartments, office purposes or other uses which do not involve the presence of combustible goods in amounts so large as to produce heat sufficiently great to endanger the iron work. Such structures are in common use, partly because of their greater cheapness as compared with the fireproof type, and also because their erection is not prohibited by the building codes of many cities.

In considering so-called "fireproof" structures it is important to bear in mind that such buildings cannot extend their character to inflammable contents. In fact, many of the hottest fires on record have occurred within fireproof structures heavily stocked with combustible goods. With this factor in mind it is the essential purpose of a so-called fireproof building to completely isolate the several stories, so that a fire will burn itself out on the floor of origin without being able to spread either up or down. To accomplish this object three main features must exist. In the first place, all the metal structural members of the building must be properly isolated against heat from the interior or exterior of the building, or the construction may be of reinforced concrete with the reinforcing members safely insulated. Communications between floors, such as elevators and stairways, must be properly encased in fireproof cut-off shafts. Moreover, all the horizontal tiers of windows should consist of wired glass in fireproof frames, this last feature being important since a fire on any given floor, if unable to go up or down through the flooring, will be forced out through the windows and will thus likely communicate to the upper stories through the tiers of windows immediately above.

In furthering up-to-date construction, probably no organization has done so much as the National Board of Fire Underwriters. Through its Committee on Construction of Buildings this national organization has prepared a national buildings code which is recognized to-day as the best and most feasible standard yet devised. Thousands of copies of this code have been distributed, and many cities have already made their building ordinances conform in whole or in part with this standard. Expert advice is also freely given by this committee to public authorities and all others interested along all lines relating to building ordinances and fire resistive construction.

Fire Protective Devices.—The large amount of wood construction has made the conflagration hazard an ever present one in practically all American cities. Unfortunately, we are confronted in this respect with "a condition and not a theory," and our cities must be considered as they stand. But much can be done along the line of limiting fires to the building of origin through the more general use of wired glass, metal window frames, automatic alarm systems, metal waste and ash cans, fire-buckets, chemical extinguishers, adequate standpipe systems, private fire departments and automatic sprinklers. The importance of these various devices in reducing the conflagration hazard, when used at strategic points in our cities, is well described by Franklin H. Wentworth, Secretary-Treasurer of the National Fire Protection Association in the following:[1]

> In the heart of nearly every city there are streets crossing at right angles along which for a very considerable distance are buildings of brick, stone and concrete. This shows a more or less complete Maltese cross of buildings which are not wood and which operate to divide the wooden-built district into quarter sections and which might hold a fire in any one of these sections if they were equipped to do so. These brick and stone buildings are ordinarily valueless as fire stops, because their windows are of thin glass and their window frames of wood. At Baltimore and San Francisco the conflagration attacked such buildings easily, breaking out the panes, consuming the frames and converting every story of these brick structures into horizontal flues full of combustible contents. Brick and stone buildings are logical and capable fire stops if the fire can be kept out of them. The small city that will trace out its Maltese cross of such buildings and equip them with metal window frames and wired glass will immediately possess the equivalent of substantial fire walls crossing at right angles in its centre, dividing it into four sections. By such a simple, inexpensive, yet strategic procedure many a city may save itself from destruction which now awaits only the right kind of a fire on the right kind of a night. . . .
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> This form of protection is equally imperative in the brick, stone and concrete districts of all large cities where great values are housed in close proximity. . . . We must come eventually to the equipment of all commercial, factory and office buildings with metal window frames and wire glass. . . . Fires will then be unit fires, extinguished easily by a competent fire department within the buildings in which they originate; for the protection of window openings not only prevents fire from entering, but prevents fire from issuing out of the burning building. . . . Having thus fortified city buildings one against the other, extensive fires within individual structures can be prevented by the use of the now well established automatic sprinkler system. The automatic sprinkler applies the water without the help of human agencies while the fire is still incipient. It will operate in a dense smoke as well as in a clear atmosphere. It will not throw excessive deluges of water in wrong places as the fire departments are continually forced to do. With our window openings protected and our buildings equipped with such extinguishers, the conflagration hazard in mercantile districts will be eliminated. There will then remain for consideration our immense residence districts constructed almost wholly of wood surrounding the mercantile centres, like fagots around a funeral pyre. We can lessen the loss here by the abolition of the use of wooden shingles.

Experience justifies the increasing reliance placed upon automatic devices for extinguishing fires in their incipiency, and here the automatic sprinkler stands supreme. Briefly described, this system consists of an elaborate arrangement of pipes regularly spaced under the ceilings for all portions of the building and supplied with water from elevated tanks, pumps or city connections. At regular intervals (for about every 75 or 80 square feet of floor area) there are so-called "sprinkler heads" which are so arranged as to open whenever a sufficient rise in temperature will soften the fusible metal with which the joints have been soldered. To meet the nature of the risk protected, the solder may be adjusted to fuse at any arranged temperature, usually from 165 to 360 degrees. When once started the flow of water will continue, and to avoid unnecessary water damage after the extinguishment of the fire it is necessary to have the system supplemented with some automatic fire alarm device connected with the city's fire department or some other central station.

The manifest advantage of such an automatic system lies in the fact that it is always on duty, and as has been well said, "applies the right amount of water in the right place at the right time," and does this without the intervention of human help. The efficiency of the plan is indicated by the fact that fully 95 per cent of the fires occurring in properties equipped with sprinklers have been controlled without serious losses resulting. Out of a total of 18,795 fires, reported with the National Fire Protection Association and covering all types of properties equipped with sprinklers, nearly 65 per cent were extinguished and nearly 31 per cent held in check. The efficacy of automatic sprinklers is further shown by the large reduction in fire insurance rates granted upon the installation of the system, the reduction in the premiums frequently amounting to 75 per cent or more. But in addition to the lower cost of insurance, the property owner has also the greater assurance of protection against the indirect losses occasioned by fire, such as the loss of time and profits and the demoralization of his business.

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[1] "American Fire Waste and Its Prevention," *Annals of the American Academy of Political and Social Science*, March 1917, pp. 163-171.

Along all the foregoing lines of fire protection the various underwriters' associations of the regular companies have brought about great improvements. Not only do the local associations maintain inspection departments for the regular inspection of sprinkler systems and other devices, but the National Fire Underwriters' Association and the National Fire Protection Association have rendered much valuable service through some of their standing committees. Thus the National Fire Underwriters' Committee on Fire Prevention has inspected the fire protection facilities of nearly 300 cities with a view to presenting conclusions as to the degree of the conflagration hazard and the way in which the fire departments and other protective features of these cities should be improved. On the other hand, the Underwriters' Laboratories, a corporation formed by the National Board of Fire Underwriters in 1902, was organized for the special purpose of testing all fire preventive devices and fire resisting materials submitted to it from time to time. The purpose of the organization, as expressed in its literature, is «to bring to the user the best obtainable opinion on the merits or demerits of appliances in respect to fire hazards. Such appliances include those designed to aid in extinguishing fires, such as automatic sprinklers, pumps and fire appliances, hose, hydrants, nozzles, valves, etc.; materials and devices designed to retard the spread of fire, such as structural methods and materials, wire doors and shutters, wire windows, etc.; and machines and fittings which may be instrumental in causing a fire, such as gas and oil appliances, electrical fittings, chemicals and the various machines and appurtenances used in lighting and heating.»

Upon the approval of any device or material, after a full test, the same is recommended and listed in the periodical publications of the National Board. Mention should also be made of the service rendered by the National Fire Protection Association in obtaining and circulating information on fire protection and prevention devices, and in securing the co-operation of its members in adopting approved safeguards. In this respect its influence is far-reaching, since the membership comprises national, State and municipal departments, chambers of commerce, business mens' associations, architects, engineers, etc. According to recent reports, at least 37 subjects have received the special study of this association. Not only have standard specifications been prepared along all these lines but the information obtained and compiled has been given the broadest possible dissemination among the varied membership already indicated.

Equipment of Buildings.— Heating, lighting and ventilating systems represent important items in all buildings, and an increasing proportion of the total number of fires is attributable to faulty installation and maintenance along these lines. Great care should be exercised in purchasing systems best suited for the business under consideration and in having them properly installed and frequently inspected thereafter. Standard specifications along these lines, and particularly in connection with the installation of electrical systems, have been prepared by the Committee on Lighting, Heating and Engineering Standards of the National Board of Fire Underwriters. These have been furnished to numerous associations, bureaus, public bodies, etc., and embody the best opinion of technical experts in the insurance business.

Occupancy Regulation.—Nearly every business has connected with it certain processes and materials which inherently constitute a dangerous fire hazard. It is, therefore, important, as the experience of American Factory Mutuals has so well demonstrated, to study the nature of each business with a view to isolating all processes of manufacture and all stocks of goods which are likely to cause a fire or to accelerate it if caused in some other part of the building. Reference is had to the segregation of the power plant or any other very hazardous process, and to the most judicious location of the several occupancies, so that the most dangerous process or contents will not be located where access in case of fire is most difficult or where the extinguishment of a fire will occasion heavy water damage to surrounding goods. Judicious planning in this respect will not only render many fires comparatively harmless, but will greatly reduce the indirect loss through water, heat and smoke.

Control of the Exposure Hazard.— An examination of any fire-rating schedule will clearly show that a substantial part of the premiums on mercantile risks in cities is charged to allow for the exposure hazard. Many property owners are made to suffer in the form of heavier premiums by the carelessness or indifference of the owners of adjoining properties. But while the action of neighbors may be beyond control, much may be done to counteract the exposure hazard, thus proportionately reducing the extra premium, by the use of various protective devices. In most instances their adoption will be found to yield a saving, in the form of a reduced insurance premium, considerably beyond an ordinary return on the capital outlay. Property owners should, therefore, study the location of their business with reference to surrounding buildings and stocks of inflammable goods. Then, in view of the existing facts, they should seek to improve their own buildings by fireproofing doors, windows, shutters, walls and roofs, by extending fire walls above the roof and by installing automatic sprinkler protection.

Management of Properties.— It has been estimated that half of America's fire waste is traceable to needless accumulation of rubbish, disorder, lack of organization in detecting and extinguishing fires and failure to promptly call the fire department. All leading rating schedules include a list of additions to the insurance premium for faulty management "easily corrected," such as improper protection of walls and floors against heating apparatus, the use of bottoms of elevator shafts for closets or waste, untidiness or carelessness in disposing of rubbish and ashes, cracked or bulged walls, broken windows, open or unprotected lights in show windows, the use of inflammable oils in sprinkling floors, steampipes in contact with wood, crowded merchandise without proper aisles, etc. The reduction in the premium upon the elimination of these easily corrected faults of management is so large as to clearly indicate that their continuance must be due to pure carelessness. As one expert puts it: "Every owner can apply in his factory, apartment house, warehouse or home numerous correctives (referring to the above) which constitute the essentials of fire prevention. He can also join any other good movements in community action to carry out this program, and to study and get prepared and enforced reasonable legal regulations whereby such correctives may be demanded in the law, and finally can back up public officials in seeing that they are applied."[*]

Public Regulation and the Enforcement of Legal Liability.— While many of the improvements in fire protection must depend upon voluntary action, an increasingly large number of the best informed students of the subject have, in recent years, come out in favor of state regulation. Why should not a matter of such vital importance to the whole community, they argue, be made the subject of compulsion in the most important particulars? Thus a special committee of the National Board of Fire Underwriters reported at the Joint Conservation Conference at Washington as far back as 1908 that the States "should adopt and enforce a building code which shall require a high type of safe construction, essentially following the code of the National Board of Fire Underwriters"; that municipalities should "adopt ordinances governing the use and keeping of explosives, especially inflammable commodities and other special hazards, such as electric wiring, the storing of refuse, waste, packing materials, etc., in buildings, yards or area ways and seek to the enforcement of such ordinances"; that the States should establish and support the office of fire marshal and entrust it with adequate powers; and that in all cities "there be a paid, well disciplined, non-political fire department adequately equipped with modern apparatus."

It is also recommended by most students of the subject that this nation should begin to follow the practice of certain European countries in placing a legal responsibility upon individuals for fires which damage their neighbor's property when occasioned by gross carelessness or the failure to observe specified requirements. By thus fixing responsibility, it is argued, we would change the attitude of mind of the American public more effectively than can be done through any system of voluntary education; in fact the man who has a fire that could have been easily avoided would be regarded as a public offender. Quoting again the aforementioned special committee:

> In a portion of Europe a landlord is responsible to his tenants and neighbors for any fire loss due to his negligence and tenants are responsible to the landlord and to their neighbors for any loss due to their negligence. In this country a whole city might be destroyed by the unmitigated carelessness of some person and there would not be the slightest penalty incurred. In Europe wastefulness is generally viewed as indefensible and a person who has a fire is regarded in an unfriendly light, since he has endangered his neighbor's property and comfort. In this country everybody is permitted to endanger his own and his neighbor's property almost *ad libitum*, either by the absence of wholesome regulating ordinances or by their non-enforcement. The reckless wastefulness of our people is nowhere more apparent than in the unnecessary fire drain on their resources. Our people appear to have a very erroneous idea of fire insurance and to think that insurance payments re-create destroyed values; whereas the fact is that insurance companies are in a sense tax collectors and distributors of such taxes among those suffering loss by fire.

As a supplement to state regulation it is also suggested that fundamental facts and principles concerning fire hazards should receive proper attention in the teaching program of our public school system. Educational efforts along fire prevention lines, in other words, should not be limited to insurance and technical organizations alone, but should be undertaken by the schools and the press. Public interest, it is argued, may also be aroused to a due appreciation of the subject through the use of the leading channels of advertising and the annual observance of so-called "fire and accident prevention days." Additional good may be accomplished by utilizing fire departments for inspection purposes, instead of confining their function exclusively to the extinguishment of fires as is done to-day. To quote F. H. Wentworth:

> In every fire department uniformed firemen should be regularly detailed for inspection service. Three or four hours a week for each man, going into basements, attics, courts and alleys, keeping down accumulations of rubbish — which spring up over night — locating the storage of inflammable oils and explosives, would keep the city clean of its most persistent fire dangers. Every fireman should in turn cover every section in the course of six months. One would thus check up the inspections of the other, and local conditions would become a matter for educative conversation about headquarters.
>
> There is, however, a most important result to be achieved by such an inspection system over and beyond keeping the city clean; and that is the education of the fire-fighters in the exact physical character of the city. To know exactly which passageways are open and which are closed; to know which are fire walls and which are not; to have a mental picture of the exposures, the windows, the roof openings, the cornices, and all the other physical details important in fire-fighting, would so heighten the team work of a department that, like expert swordsmen, they could make their thrust without loss of time straight at the vulnerable part. There are a few cities in the United States where such practice, partially in effect, has already demonstrated its singular efficiency. The citizens of every town and city should demand this sort of service from its fire department.

Study of Fire Causes and the Prevention of Dishonest Fires.— Since a large part of the nation's fire waste is traceable to the moral hazard, it is important that the origin of all fires should be carefully investigated. Even where no dishonesty is detected, a full record of the causes of fires will furnish much valuable information as to the relative importance of the various factors that make up the fire hazard. To attain this worthy end, it is essential that every State should establish the office of fire marshal with a sufficient working personnel. This department should have conferred upon it the power to examine under oath and to make arrests. The law should also make it the duty of this department to examine into the origin of all fires, and where a crime has been committed to submit its findings to the prosecuting authorities. Much has been done to eliminate dishonest and easily preventable fires by the National Board of Fire Underwriters through its two committees on «Statistics and Origin of Fires» and «Incendiarism and Arson.» But such voluntary efforts, it is believed, can be improved upon and certainly assisted by the efforts of the State through some regularly organized department.

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[*] F. H. Wentworth, "American Fire Waste and Its Prevention," *Annals of the American Academy of Political and Social Science*, March 1917, pp. 163–171.

Bibliography.— Crosby and Fiske, 'Handbook of Fire Protection for Improved Risks' (5th ed., New York 1914); Evans, Powell, 'A Five-years' Fight Against Fire Waste and Its Possible Control in the United States by Fire Prevention and Protection' (Philadelphia 1912); 'Fire Prevention and Control Supplement' (issued by the *Evening Post*, New York 1918); Freitag, J. K., 'Fire Prevention and Fire Protection' (New York 1914); Gephart, W. F., 'Principles of Insurance' (Vol. II, Chapter 11); Huebner, 'Property Insurance' (New York 1911); Riegel, Robert, 'Fire Underwriters' Associations in the United States' (New York 1916); «The Fire Waste in the United States» (address by Special Committee of the National Board of Fire Underwriters at the Joint Conservation Conference held in Washington, D. C., 1908); Wentworth, F. H., «American Fire Waste» (published in 'Modern Insurance Problems,' *Annals of the American Academy of Political and Social Science,* Philadelphia 1917); Zartman, L. W., 'Yale Readings in Fire Insurance' (Chapters 13, 14, 15 and 16, New Haven 1909).

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FIRE QUARTERS, the name given on board ship to the drilling of the crew for a possible or actual case of fire. Every member of the crew has his appointed station and duty, and upon hearing the special signal for this drill must at once leave the task in hand and repair to his station. On the larger passenger steamships fire drills are frequent, as also boat drill and other measures for the safety of the ship and its passengers.

FIRE SALAMANDER. See Salamander.

FIRE-SHIPS are generally old vessels filled with combustibles, fitted with grappling-irons, to hook enemies' ships and set them on fire. If they are used on a river they are allowed to be carried down by the current, if they are used at sea advantage is taken of a favorable wind to bear them into the midst of the enemy and set their ships on fire. In ancient times the Tyrians employed them against Alexander, and the Carthaginians against the Romans. The invention of Greek fire in 673 brought them into more frequent use; and they were employed by the Crusaders at Ptolemais (Acre). In the time of Philip II the Spaniards suffered severely by them on two well-known occasions. The first was at the siege of Antwerp in 1585, when by means of fire-ships Gianibelli utterly destroyed a bridge that the Duke of Parma was attempting to throw over the Scheldt, with the aid of some other vessels which he had prepared so as to explode when they reached the bridge. The second case was when Lord Howard of Effingham used them with such effect against the Armada in 1588. In this case also their use is said to have been suggested by Gianibelli. Fire-ships were employed during the siege of Quebec in 1759; on one of these the gallant Dubois de la Milletière perished. The Greeks in their war of liberation against Turkey also employed them with great success.

FIRE-TOAD, or **FIRE-BELLIED FROG,** one of the commoner and more aquatic of the European toads or frogs (*Bombinator igneus*), so called because of the flame-colored patches upon the bluish-black abdomen. They are one and one-half to two inches long and have many peculiar and interesting habits, and make good use of the colors. «When these toads,» says Gadow, «are surprised on land, or roughly touched, they curl themselves into an extraordinary attitude displaying the red of their bellies and throats, and remain so until the danger is past, expecting that the enemy will let them alone after having been shown with what a terrible creature it had to deal.» In fact the secretions of the skin are very poisonous, and not even turtles will eat them knowingly. This toad inhabits north-central Europe, and two other species of the genus are known, one in China. It is called «unke» in Germany. Detailed accounts of the animal may be found in Gadow, H., «Amphibia and Reptiles» (in 'Cambridge Natural History,' Vol. VIII, London 1901).

FIRE WALKING, a religious ceremony common to many races in widely separated parts of the world. Its origin and meaning are obscure but it is known to have been widespread in all ages and still survives in Tahiti, India, Fiji Islands, Japan, the Straits Settlements and Mauritius. The essential feature of the ceremony is the passing of priests or other devotees barefoot over heated stones or smoldering ashes. Though at times severely burned the devotees claimed that they would have been uninjured if they had faith. The feat in many instances so surprising is susceptible of a rational explanation. For instance, at Tahiti it was found that the volcanic rock used in the fire ceremony is a poor conductor of heat, so that while the bed of stones would be very hot underneath the upper part would be considered only very warm. Akin to this ceremony is the fire dance of a number of North American Indian tribes, wherein the dancers stamp out the glowing embers of a fire with their feet during the dance. Consult Fraser, 'Golden Bough'; Lang, A., 'Magic and Religion' (London 1901); Crooke, W., 'Introduction to Popular Religion and Folklore of Northern India' (1896); Langley, S. P., (in *Nature,* 22 Aug. 1901).

FIRE WORSHIP. See Nature Worship; Mythology.

FIRE WORSHIPPERS, the Zoroastrians, called also Guebres, Guebers, Ghebers, Gebers or Gabers. See Guebers; Parsees; Zoroaster.

FIREARMS, a general term for all sorts of cannon, guns, rifles, fowling-pieces, pistols, etc., which effect their discharge by the combustion of gunpowder or other explosive. See Guns; Pistol; Rifle.

FIREBIRD. See Tanager.

FIRELESS COOKER, an appliance by means of which foods that have been heated or partially cooked are kept hot until the cooking process is completed. The usual design is a box lined with insulating material in which the pot containing partially cooked foods is placed. There are many designs on the market but all are on the same principle, differing only in details of construction, and the kind of insulating material used. Some types are provided with soapstone or iron plates which are heated during the preliminary cooking on the stove and then placed in the fireless cooker either over or under the cooking pot. In these types a non-inflammable insulating material is used. Fireless cookers have successfully been made at home by taking a box so large that the cooking pot when placed in it may be surrounded by a thick layer of non-conducting material, such as hay, excelsior or crumpled paper. A cushion is placed over the pot and a tight-fitting lid is placed over all. The advantages claimed for the fireless cooker are economy of fuel, convenience and economy of time. Consult Davis and Wood, ‘Illustrated Lecture on the Home-made Fireless Cooker’ (United States Department of Agriculture, Syllabus 15, Washington 1914); Huntington, E. H., ‘Fireless Cooker’ (University of Wisconsin Bulletin 217, Madison 1908); Lovewell, Whittemore and Lyon, ‘The Fireless Cooker’ (Topeka 1908); Mitchell, M. J., ‘The Fireless Cook Book’ (New York 1909).

FIRENZE. See FLORENCE.

FIRENZUOLA, fē'rĕn-zwō'la', **Agnolo,** Italian poet and littérateur: b. Florence, 28 Sept. 1493; d. about 1546. He was destined by his family for the legal profession, and studied first at Siena and afterward at Perugia. He associated with the vicious Pietro Aretino, and his life was very licentious. He practised law for a time in Rome but met with little success. It is said by several of his biographers that he became a monk at Vallombrosa, but this is doubted by Tiraboschi, for lack of evidence, and it is not borne out by his mode of life which was far from being ascetic. By Clement VII he was guaranteed an income sufficient to permit him to pursue a literary career in Florence whither he removed from Rome. His works are partly in prose and partly in verse, and belong to the class of light literature. The prose works include ‘Discorsi degli animali,’ in imitation of Esop; ‘Dialogo delle bellezze delle donne’; ‘Ragionamenti amorosi’; ‘Discucciamento delle nuove lettere,’ a translation of ‘The Golden Ass’ of Apuleius, and the comedies ‘I Lucidi’ and ‘Le Trinuzia.’ His poems are satirical for the most part. His works are regarded as models of literary excellence. Consult Bianchi's edition of Firenzuola (Florence 1848); Guerrini, ‘Novelle di Firenzuola’ (ib. 1886); Rosai, M., ‘L'Asino d'oro di Agnolo Firenzuola’ (Cittàdi Castello 1901).

FIREPROOF CONSTRUCTION.* Fire prevention and fire protection, of which latter fire-resisting construction is a part, are two divisions of the effort to reduce the danger and waste incident to hostile fire. The immense property loss alone from this cause and the consequent significance of this effort are seen from the following figures of the annual fire losses in the United States:

1908........	$217,885,850	1913........	$203,763,550
1909........	188,705,150	1914........	221,439,350
1910........	214,003,300	1915........	172,033,200
1911........	217,004,575	1916........	214,530,995
1912........	206,438,900	1917	*230,000,000

* Approximate.

Such losses far exceed the liabilities in commercial failures in 1916, the normal expenditures of the War Department, the gold and silver production of the United States and the interest on the national debt. A street, lined on both sides with the buildings destroyed in one year, 1917, by fire, would reach from New York to Chicago. One hundred and forty acres of property and 1,343 buildings were destroyed in the Baltimore fire of 1904 and 3,000 acres and 25,000 buildings in the San Francisco earthquake and fire of 1906. That the greater portion of this loss is unnecessary is shown by the fewer fires and the smaller fire loss per capita in European cities.

The universal construction of buildings designed to prevent the radiation, absorption and transmission of fire would reduce the annual value destroyed by this agency to a mere shadow of its present size and produce a tremendous social benefit. Undoubtedly also such efforts would bring pecuniary profit to the individuals of the community in the majority of instances. A fireproof building in the real sense of the words must at present, however, be viewed as an ideal rather than a reality. Important conflagrations have shown on the one hand the value of fire-resisting construction and on the other its limitations. Individual buildings of this nature cannot stand unharmed by a conflagration in the midst of inferior construction and even isolated fires have damaged them in some instances to the extent of 75 per cent, where important defects in construction existed. The problem of fire-resisting construction is, therefore, one of degree; the solution involves a study of comparative values of types of design, kinds of materials and protective appliances.

A fire-resisting building may be defined as one which will confine a fire originating in the building to the unit of area of origination, will protect itself and its contents from adjacent fires, and will not transmit fire to buildings beyond. It, therefore, comprises far more than an agglomeration of non-combustible and fire-defying materials.

The struggle to reduce the immense fire losses previously mentioned involves (1) fire prevention (see FIRE PREVENTION), or removal of causes and (2) fire protection or defense subsequent to ignition. (See FIRE PROTECTION). Fire protection, with one phase of which we are here concerned, includes (a) fire-resisting construction and (b) protective devices for the automatic detection and instant extinguishment of fire.

Fire-Resisting Construction.— While popular attention has been primarily attracted to the materials used for fire resistance, because their significance is readily perceived, careful reflection will indicate two equally important divisions: (1) material employed for fundamental structural parts, insulating and protective purposes and the reduction of combustible finish;

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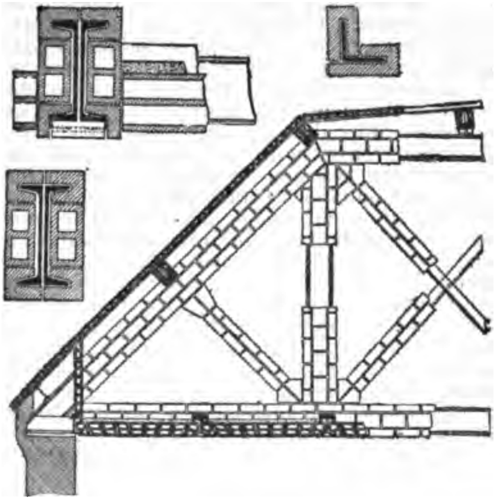
(2) design, which is of equal importance with material. The circumstances of every building will produce a unique problem, to be individually considered. Fire-resistance does not merely comprehend the presence of some fireproof paint, protected columns, terra-cotta floors, etc., important as these individual features may be, but demands a plan or arrangement for the entire structure, provision of the details adequate to the consummation of the plan, intelligent application of material to necessary purposes and supplementary appliances for the discovery and extinction of fire.

MATERIALS.

Space does not permit of a discussion of the value of every conceivable variety of building material and attention must therefore be directed to those which are commonly used or are of especial importance and utility.

1. *Wrought Iron, Steel and Cast Iron.*—Wrought iron and steel are largely used as beams, girders, columns or trusses, supporting not merely their own weight but also bearing an additional load — often a very great one. Subjection to tests and the exacting conditions of conflagrations show that, unprotected, these materials are very unreliable. Unprotected steel, for example, will expand with each 100 degrees Fahrenheit so as to increase one inch in each 125 feet of length, an expansion at times sufficient to overthrow masonry bearing-walls. Steel columns are estimated, as a result of tests, to yield at temperatures of from 1,000 to 1,200 degrees Fahrenheit. With efficient protection, however, the steel framework of modern construction has demonstrated its value. Under these conditions, the end of the San Francisco fire found it usually uninjured. Cast-iron is most frequently used for columns supporting light loads and for ornamental construction. In moderate fires it may stand unprotected with insignificant damage. Above 1,500 degrees, however, the limit of its endurance is reached, with the consequent possible collapse of structures. Unprotected steel and iron members bearing loads are therefore a source of considerable uncertainty and danger.



Fireproofing of Steel Roof Trusses.

2. *Stone.*— Granite, limestone, marble, sandstone and all other building stones may be briefly dismissed with the statement that they will, under the action of heat, crack, disintegrate into sand, decompose into lime and spall. They have not the value which cursory thought would indicate. A photograph of a public storehouse in Baltimore showed granite columns completely destroyed by the fire and the percentage of loss to value of stone fronts is very high. Beautiful ornamental masonry fronts emerged from the San Francisco fire as ruins. The use of stone should therefore be confined to situations where severe exposure to heat is not anticipated.

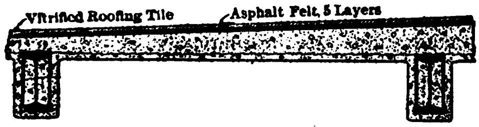
3. *Brickwork.*—The value of this material has been conclusively demonstrated by many fires and conflagrations, the degree of value depending principally upon the chemical composition of the clay. Sand-lime bricks are said to be of value at least equal to the ordinary type. Conflicting testimony makes a conclusion as to pressed-brick difficult and glazed brick showed considerable scaling in the Baltimore and San Francisco conflagrations.

4. *Terra-cotta.*—This differs from brick in that it consists of two or more specially selected clays, used in definite proportions, with the addition of grit. Each piece is made, furthermore, according to design and is not of stock form. It is extremely durable and impervious to water. The results of architectural terra-cotta were disappointing in the two great fires above mentioned, the loss of value being often 70 to 75 per cent. This was principally due, however, to "mechanical damage caused by poor construction or the expansion of covered steel members." Terra-cotta fronts suffered considerable damage in San Francisco, although the material retained its form. Opinions regarding structural terra-cotta vary widely, the relative value of concrete and structural terra-cotta being a question brought into prominence by the large conflagrations. Important uses of these materials are for floors and column protection. An intermediate opinion seems to be that porous and semi-porous tile withstands a reasonable test, if intelligently used in sufficient quantity — a condition, however, seldom fulfilled in the past.

5. *Concrete.*—There are three primarily important uses of this material, which has been in the limelight of discussion for some time — (a) floor construction, (b) column protection and (c) reinforced concrete buildings. Broadly speaking, concrete is used for floor construction under two types of conditions; where steel columns, girders and beams furnish the support and where the entire construction is of concrete. From previous remarks it is evident that steel supports require protection and columns will be more fully discussed later. The applicability of concrete to floor and roof construction has largely been made possible by the introduction of forms of metal reinforcement, which on the one hand add tensile strength while on the other they reduce the thickness and weight. Tests show that concrete floors may be so constructed as to embody a high degree of fire resistance and great load-carrying ability under emergencies. Opinions as to their value, emanating from authorities on the basis of actual conditions in San Francisco, are divergent. Some, regarding it as a fireproofing material, are dis-

tinctly favorable, while others, from the standpoint of load-bearing ability, are less enthusiastic. To a considerable degree results depend upon the type of construction. There should also be mentioned the combination terra-cotta and concrete floor, on which little data under actual conditions is as yet available.

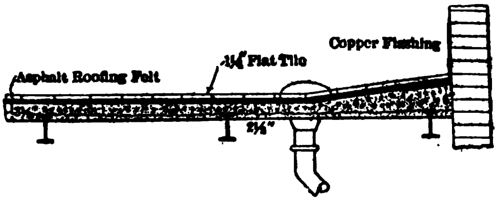
For two reasons interior columns are extremely important factors in fire-resisting construction; in the first place they support immense loads increasing with the area and height of the building, and secondly, they stand exposed to fire on all sides. Concrete, among other materials, has been used as a protection. The San Francisco fire furnishes the only important test of efficiency under actual conditions and the general conclusion that concrete was only excelled in value by bricks laid in cement mortar. The latter protection, however, is both heavy and expensive.



Concrete Roof Construction. U. S. Public Building, Los Angeles, Cal.

The use of concrete for building construction has been steadily increasing, and due to the high cost and scarcity of other materials this increase was accelerated in 1916 and 1917. Of the three ingredients of concrete, cement has been most perfected. Stone is also fairly well standardized, and the third factor, water, is now assuming importance. The fire-resisting qualities of the material depend upon its composition and handling. Its principal use at the present time is for the construction of factories and industrial buildings. The destruction in Canada in 1917 of the large Quaker Oats factory, composed almost entirely of concrete, is another indication of the fact that the term "fire-proof" is as yet a purely relative one.

6. *Mortar and Plaster.*—Many grades of this material are used for fire-resisting purposes, and as the effect of fire upon the material itself is only a question of the duration and intensity of heat it must be employed with care. Suspended ceilings of metal lath and plaster, however, have demonstrated usefulness purely as a protection to floors and floor-beams; their destruction is inevitable but the effect of fire upon essential structural parts is delayed and subdued. As a column protection plaster is far inferior to concrete and brick.



Concrete Roof Construction. U. S. Public Building, San Francisco.

7. *Sorel Stone.*—This artifical stone is chiefly employed in the production of monolithic floors. Those made with sand as a base or the granular variety are often dusty but a satisfactory floor has excellent fire-resisting properties.

8. *Fire-retardant Wood.*—The process of treating the wood is to withdraw the sap, resin and gum by a vacuum, introduce an ammonia solution under pressure and kiln-dry the wood. Crystals of the absorbed solution remain in the wood and these, fusing at high temperatures, retard combustion. Ignition of hard woods, which would otherwise ensue in a few seconds, has been shown by tests to be delayed for five minutes by this treatment.

9. *Asbestos.*—Asbestos is non-combustible and non-conductive and may be used to delay the progress of fire but loses its life and powders under intense heat. A well-known use is in theatre curtains, where the object is to confine the fire to the stage a sufficient time to permit the evacuation of the building. It is also used in composition with hydraulic cement for the manufacture of so-called asbestos lumber, sheathing and shingles and in such combinations is a valuable fire-resistant.

10. *Glass.*—Ordinary glass cracks under heat and affords no protection whatever from fire. Wireglass, known since 1855 but only recently employed for its fireproof qualities, is ordinary glass with a wire mesh imbedded, made with one pouring and rolling. The wire mesh prevents the heat-cracked glass from falling away and renders glass available for use in windows, doors, elevator shafts and skylights, where other material is unsuitable by reason of light requirements.

It should be noted that in the use of all materials cost, durability and weight are important factors from an engineering standpoint, to which factors no consideration has been given here.

DESIGN.

The objects of fire-resisting construction are (1) to confine a fire originating in the building to the area-unit of origination, (2) to guard the contents from destruction, (3) to protect itself in absolutely essential respects so as to keep reconstruction costs at a minimum and (4) to prevent the spread of fire. This will involve not merely the specification of fire-resisting materials but the proper subdivision of area, protection from adjacent exposures which may transmit and radiate hazard, adequate provision of light and air without dangerous fire-conducting shafts, suitable location of elevators and stairways and a construction scheme enabling the employment of proper materials; in other words, appropriate design. Many illustrations might be cited of important considerations overlooked in apparently well-protected buildings, such as the Granite Building in Rochester with 2,000 square feet of unprotected communicating openings to a hazardous adjoining building and the Parker Building in New York with unprotected stair and elevator shafts, unsuitable corridor partitions and lack of auxiliary aids and automatic detection facilities.

1. Character of Building.—An essential factor in any plan is the determination of its primary purpose or purposes, since the general scheme of construction will quite evidently depend upon whether occupants, contents, the structure itself or a combination of these are to be safeguarded. In places intended for public assembly, for illustration, preservation of life must take precedence over other desirable features; in large retail establishments safety of life and contents are both to be considered; in nearly all manufacturing establishments special hazards deserve attention — materials and processes which are more or less peculiar to the special industry. The importance of this latter factor is apparent from the attention devoted to it by fire underwriters and fire-protection engineers. The isolation of dangerous features of production by confinement to separately safeguarded buildings, floors or compartments will serve to decrease loss of life, reduce the extent of material damage and eliminate consequential loss through subsequent disturbance of work in other departments. The importance of the above considerations, though readily admitted and indeed self-evident, is often overlooked and submerged in the mass of construction details, as is evidenced by many notable fires of the past.

2. Limitation of Occupancy.— Private enterprise and public regulation necessarily go hand in hand in the repression of unnecessary fire loss. The preceding paragraph has referred to buildings designed for a particular occupancy, but through economic changes buildings are often diverted from their original purposes and the character of occupancy entirely changed. In order to guard against possible unfortunate results from such changes careful municipal regulation is necessary. While great restriction is obviously impossible, some limitation of the number and character of tenants is absolutely requisite to avoid at least partial nullification of original designs.

3. Stairways, Elevators and Fire-escapes.— Aside from provision of emergency exits such features must be considered as facilities for fire-fighting and possible avenues of fire transmission. They furnish exceptional assistance when adequately isolated so as to be safe for firemen, while on the other hand insufficient and unsafe provision is merely a detriment and a menace to the safety of persons as well as property. The importance of all floor openings in the transmission of fire is readily perceivable. Fire-resisting floor construction is of little avail if unprotected vertical passages are introduced. Just as fire-resisting material in walls should be supplemented by window protection, so should vertical openings in otherwise non-communicating floors be supplemented by protection of floor openings. In a sense the entire Baltimore conflagration is ascribable to neglect of this principle, since otherwise the fire might have been extinguished or controlled at its inception. The protective methods are more fully discussed later.

4. Exposure Hazard.— The site of the proposed building is a governing factor in its design by reason of the existent surrounding hazards. At least 25 per cent of fire losses are due to exposure. Against particularly dangerous neighbors blank brick walls or at least walls with but few openings of minimum size should be provided. In this connection the character of the roof is not to be neglected.

5. Subdivision of Area.— This is an accepted fundamental feature of fire-resisting construction, from which has developed the analogous idea of the subdivision of city areas by «fire walls.» In the first place it localizes the fire by confining it to the unit of area of origination, thus definitely limiting the consequences. Thus the entire compartment contents may be destroyed and the trimming consumed without appreciably affecting the remaining area. Even more or less inadequate partitions will prevent strong drafts and furnish barriers for fire-fighting. Secondly, just as a building with non-resistive floors may become a gigantic vertical flue so may a single undivided floor assume the function of an immense horizontal flue. The division of area prevents strong drafts from the openings nearest the exposure across the building to those opposite. Past conflagrations are testimonials of the accelerated transmission and the greater intensity of fire on undivided floors. Thirdly, a large area presents additional difficulty in fire-fighting, augmenting the difficulty of surrounding the fire, setting out the apparatus and the cover of smoke.

The importance of the factor of area is recognized in all the widely-used fire insurance rating schedules by charging an extra premium for areas exceeding the «standard.» In the Universal Mercantile Schedule, widely used in modified form in the East, 2,500 square feet is figured as a basis. In the Analytic Schedule also provision is made for this feature and recent schedules have shown no tendency to minimize its importance. It is nevertheless true that practical considerations often restrict its application. In office buildings, hotels and apartment houses comparatively little difficulty is presented, but in factories, warehouses, manufacturing plants and even wholesale, retail and department stores, large areas are often deemed indispensable. The same is true of transportation terminals, armories and theatres. Often, however, ingenuity will suggest at least partial measures of protection if the necessity is recognized.

6. Non-communicating Floors and Vertical Openings.— If the above facts demonstrate the necessity for the subdivision of horizontal areas, the surpassing need for the subdivision of vertical areas is a corollary. It is this necessity which has given the principle of the fire-resisting floor its importance, an importance so great that the name «fireproof» is now seldom applied to a building with non-isolated floors. But the effectiveness of floor protection and fire-resisting design may be largely nullified by a building feature in common use because of its pretentiousness and the difficulty of otherwise obtaining adequate illumination. This is the interior court or open light-well, prominent in many hotels and office buildings. In some cases it emanates from practical difficulties of otherwise obtaining light and in others from the desire to give the impression of extensive interior area. But past experience shows that this feature has resulted in rapid spread of fire, impossibility of extinction and threatened suffocation by smoke. A classic illustration of the results are found in the Horne Building fire, where a fire in an extremely hazardous adjoining risk was communicated to the Horne store and office buildings, Pittsburgh. The store building was pierced vertically by a 20 x 50 light-well, extending from the first floor to the roof. The intense heat and tremendous uprush of flame thus induced and promoted was the immediate cause of a $2,500,000 loss. The building was reconstructed, with the retention of several of the vital defects, and in 1900 was again seriously damaged by fire. Again the open light-well made a generous contribution to the damage.

All vertical openings, including elevator shafts, stairways and small light and ventilation shafts are open to the same defects. Where vertical openings must exist their hazard should be ameliorated by protective devices, preventing them from functioning as fire passageways. This necessity has given rise to numerous mechanical devices and protective construction, which are described later.

7. Isolation of Special Hazards.— Wherever a known hazard exists, of course, special measures of protection should be taken. The most common illustration of the application of this idea is the isolation of boiler and engine rooms, a requirement enforced by all good municipal building codes. In connection with many manufacturing enterprises there are numerous special hazards incidental to the processes and material used which should be isolated and since conditions vary greatly a general discussion is without value.

8. Reduction of Combustible Material.— The extent of the fire loss would be considerably reduced by the elimination of combustible materials in trim and finish. A study of 23 so-called «fireproof» buildings in the Baltimore conflagration showed, even in these better types of construction, a ratio of insurance losses to total insurance on this item of about 90 per cent. A study of eight of the larger buildings showed the proportion of fire damage to value on the various construction items to be:

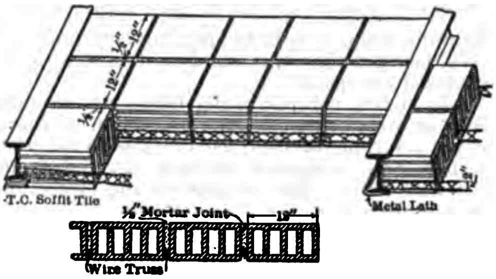
Foundations	4	Per cent
Steel Frame	13	"
Mason Work	40	"
Equipment	63	"
Trim and finish	84	"
General Expenses	62	"

The San Francisco fire also exhibited large losses sustained on ornamental fronts, combustible finish and trim, ornamental columns, etc.

Protective Devices.— In addition to design and material human ingenuity has been exercised in another and supplementary field of protection, devising more or less mechanical inventions for extinguishing, preventing the spread and giving warning of fire. They form an important adjunct to the other factors in fire prevention and protection and are described elsewhere under the designation FIRE PROTECTION.

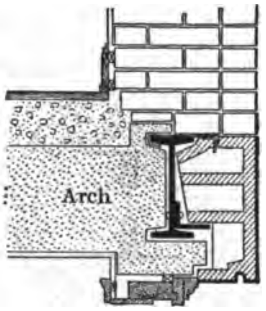
Special Features of Construction.— It is desirable to consider at greater length a few of the more important individual features of fireproof buildings, including some which are usually fundamental to the support of the building, such as walls, girders, columns, arches and others which contribute to the safety or peril of these fundamental features such as vertical and horizontal openings.

1. Walls.— Exterior walls in fire-resisting buildings may be of three types; (1) those which support a load in addition to their own weight, or «load-supporting,» (2) those which support merely themselves or «self-supporting» and (3) those which are dependent for support upon a steel framework, sometimes called «curtain walls.» Prior to the skeleton-constructed buildings exterior walls were built of masonry, without the support of metal columns and this is still feasible in buildings of moderate height. In the earlier skeleton-constructed buildings self-supporting walls were employed, the loads being borne by metal columns within the walls. The modern fireproof building has entailed the curtain wall, which is hung upon the steel frame like a masonry or concrete envelope; in reality each story has its own four walls.

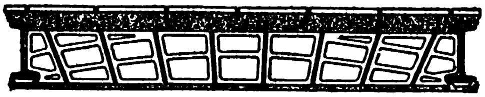


" New York " Reinforced End-construction Arch.

As regards fire-resistance the walls may be viewed from two standpoints, the extent of fire damage and cost of reconstruction. It has been conclusively demonstrated that the self-supporting masonry wall suffers less from fire damage than the curtain wall. In the latter the wall-carrying beams are frequently so near the surface as to permit expansion and bending, thus wrecking the wall. From the standpoint of reconstruction cost, however, the curtain wall is superior, assuming always that it is sufficient for the protection of the enclosed steel frame. Damage to a portion of a self-supporting wall often involves the removal of large unaffected areas, while the load-bearing function renders this type of wall liable to complete collapse. Parts of the curtain wall, however, may be easily removed and replaced.

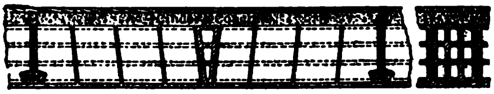


Typical Spandrel Section Wall Construction.



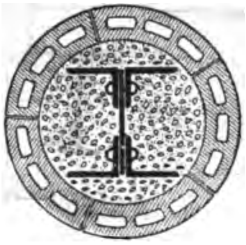
Side-construction Arch, Radial Joints and Arched Webs.

The most satisfactory wall materials are brick, terra-cotta and concrete. Iron and stone are sometimes employed but the latter cannot be relied upon as a protection for the steel framework. Stone work should be absolutely free from any load-bearing function as it suffers severely under high temperatures. The use of brick as a fire-resisting material has already been discussed. Structural terra-cotta may be used for walls where the building contains no large amount of combustible material and has no severe exposure. Concrete walls strengthened by reinforcing iron rods are also very satisfactory, being made either solid or double with an enclosed air space.


Deep End-construction Arch with Side-construction Key.

As stated, exterior walls frequently contain iron or steel columns. The protection of these is not a serious problem usually, due to the protection and additional strength derived from the wall itself. The problem of the protection of interior columns is more difficult.

2. *Column Protection.*— The most important load-supporting members of a building are the interior columns and yet these stand isolated and exposed to fire on all sides, so that their protection becomes a primary consideration in the fire-resisting building. The requirements for an efficient column protection are (a) resistance to fire and water, so that the column may be protected through a long fire; (b) non-conductivity of heat so that the metal column will not expand, bend or buckle from heat; (c) tenacity of position so as not to crack and fall; (d) adequate thickness; (e) good construction. It was formerly considered advisable in column protection to leave an air space between the column and its protecting coat to act as heat insulation. The testimony of investigators of the San Francisco fire, however, proves this method to be inferior to the solid covering. The types of column protection principally used are as follows:


Circular Terra-Cotta and Concrete Column Protection.

(*a*) *Metal Lath and Plaster.*— This consists in wrapping the column with wire netting to which plaster is applied. If wrapped too tightly the plaster does not take hold and falls quickly under fire. Furring strips are therefore used to permit the proper application of plaster. This method is improved by a double application of lath and plaster, with a space between. All such protections, however, were shown at Baltimore and San Francisco to be insufficient to endure severe conditions and must be considered merely as suited to withstand moderate temperatures.

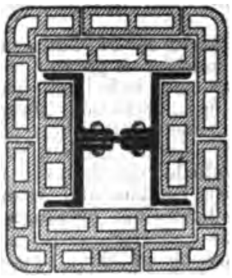
(*b*) *Plaster Blocks.*— These are entirely unreliable, due to disintegration by heat and water.

(*c*) *Terra-cotta.*— This method consists of surrounding the column with terra-cotta blocks, either solid or hollow, shaped to conform to the column. Any space intervening between the column and the protection should be filled with concrete or additional terra-cotta. It is difficult to estimate the efficiency of the terra-cotta protection from actual experience because of the poor quality of construction in the past, which has already made the method insufficient in practice, however good theoretically. In the San Francisco and Baltimore fires this material did not equal others, partly from this cause.

(*d*) *Concrete.*— This method is simply the application of solid concrete to the exterior of the column and received its first practical test in the San Francisco fire. The showing made was exceptionally good, being only equaled by brick protection and the use of concrete for the purpose has subsequently considerably increased as a consequence.

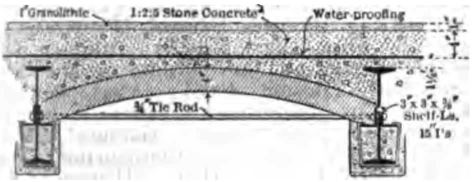
Guastavino Construction, Chicago and Northwestern Terminal, Chicago.

(*e*) *Brick.*— Brick column protection must be conceded to be the most efficient general form. This was demonstrated in the Baltimore fire, where brick was practically the only satisfactory protection found and in the San Francisco fire, where both brick and concrete protection could be observed, with the consensus of opinion in favor of the brick. It is, however, undesirable from the standpoint of weight and expense.

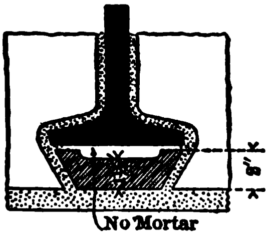

Column Protection "The Fair" Building, Chicago.

(*f*) *Reinforced Concrete Columns.*— In spite of their constituent material these columns require protection. Tests show a loss of 70 per cent load-carrying capacity under extreme heat but no such loss when protected.

3. *Floors, Beams and Girders.*— Floors may be constructed of terra-cotta, concrete and combinations of these. Brick must be practically eliminated because of its weight and expensiveness. There is great variation in the evidence afforded by actual tests of terra-cotta arches. In individual building fires the damage has sometimes been small and sometimes great, while in the San Francisco conflagration the use of hard-burned tile exclusively and poor workmanship make a judgment difficult. The conclusion seems to be that in the main hollow-tile arches will carry the necessary loads and are usually damaged little by fire. Concrete floors, as shown by tests, may be so constructed as to sustain heavy loads and a very high degree of heat. Stone concrete and gravel concrete, however, lose some strength under temperatures unusual in ordinary building fires. On the other hand if damage to the floor ensues complete replacement is generally necessary.



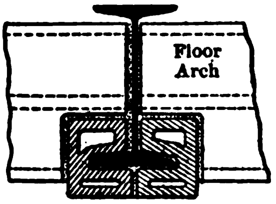
Brick Arch Construction in Post Office Building, Los Angeles, Cal.



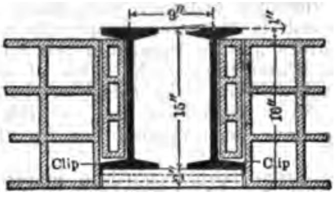
Detail of 2-in. Soffit Tile Beam Protection.

The protection of beams and girders is of the highest importance, judging by the failures which have taken place in many instances, and terra-cotta and concrete are chiefly used for the purpose. Both are satisfactory if the workmanship is good.

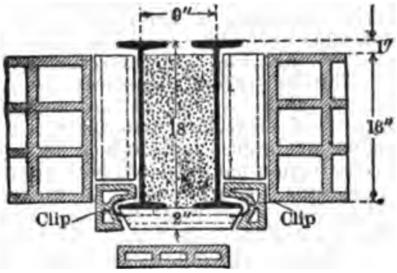
4. *Fire Doors, Windows and Shutters.*— On the general principle that openings should not be materially weaker from the standpoint of fire protection than the wall, partition or floor in which they are placed, fire-resisting doors are an important part of the construction. These are tin-clad, plate-iron, composite, corrugated iron, rolling steel, kalamine and hollow-metallic. Tin-clad doors are the best cheap protection available, although they are subject to deterioration and damage by rust, bending and breaking. Plate-iron doors are superior to tin-clad except that they radiate twice as much heat. Corrugated-iron doors are accepted by underwriters as the equivalent of the standard door. Steel rolling doors are excellent, though expensive, and are generally automatic in action, a feature discussed later. Kalamine doors are wood-constructed, covered with asbestos paper and enclosed with sheet metal, being extensively used in office buildings, but are not approved by the underwriters for fire walls. One of the most important features of the fire door is an arrangement which will close the door automatically at a high temperature, usually consisting of a fusible link, pulley and weight. This insures that at the important moment the door will not be left open through carelessness or inability to reach it. The importance of the fire door as a means of protection is illustrated in the San Francisco disaster by the experience of the Pacific States Telephone and Telegraph Company building, which would probably have suffered little damage except for an open rear door, the effect of which was disastrous.



Detail of Beam Protection with Shoe Tiles.



Double I-Beam Girder Protection.



Double I-Beam Girders projecting below Ceiling.

Fire shutters and fire-resisting windows are particularly important by reason of the enormous number of losses caused by exposure. Conditions within the owner's own building can be controlled, but this does not eliminate the danger from neighboring buildings. It will be remembered that a fire-resisting building was defined as one which would protect itself and the contents against contiguous and adjacent fire. In addition there is the danger of fire spreading from floor to floor by means of the windows. For the purpose of protecting windows open sprinklers, shutters and metal frames in combination with special glass are used. Open sprinklers are intended to throw a curtain of water over the windows to prevent fire from entering and to extinguish any ignition.

(See Fire Protection). The shutters employed are similar to the fire doors already described, both in material employed and methods of automatic operation. Shutters should be capable of being opened from the outside to allow access to firemen and protected hose holes should be provided. A less efficient but more pleasing protection is a combination of metal frames and sash and wire-glass panes. Automatic operation of the sash is also employed. The wire-glass used for the window has already been described and is not a new invention although its extensive use for fire protection is comparatively recent. Wire-glass radiates heat and therefore is far from complete protection. Inflammable contents may be ignited by the heat passing through ordinary wire-glass; double-glassed sash is therefore frequently employed and shutters are an important auxiliary. An excellent illustration of the value of the wire-glass window is the California Electrical Works in the San Francisco fire, which would probably have been burned but for this protection.

Aside from facts regarding materials and construction the primary purposes of this article, briefly stated, have been to show:

(1) That the popular term «fireproof» must be taken in a relative rather than an absolute sense, because the best fire-resisting buildings with unsuitable surroundings often suffer considerable damage in large conflagrations.

(2) That fire-resisting construction is a phase of fire protection which is closely correlated with fire prevention.

(3) That materials, design and construction are three equally important factors in the creation of an efficient structure. It has been clearly indicated that an agglomeration of non-combustible materials without appropriate design does not constitute a fire-resisting building. The design, secondly, must be such as to permit of the use of fire-resisting materials. Thirdly, several instances have been mentioned, such as the use of terra-cotta, application of protective material to columns, protection of beams and girders, etc., where poor construction has rendered both design and material futile. Furthermore, all the various individual features of protection are closely interrelated; adequate walls may be rendered useless by unprotected windows and doors, otherwise well-constructed floors may be rendered useless by the existence of unprotected stairways and elevator shafts, the division of area should be supplemented by an automatic sprinkler system, proper stairways are essential to fire extinguishment and so on, almost indefinitely. Immunity from the danger and waste of fire consists not of the provision of non-combustible materials, nor of special types of design, nor of miscellaneous protective devices, but of an intelligent combination of these, coexistent with building restrictions, public fire protection, auxiliary devices and the elimination of preventable causes.

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FIREPROOF SAFES. See Safe; Safe Industry in America.

FIRES, Notable. Among the more important and disastrous conflagrations of history were the following:

64. Rome burned for eight days; most of city destroyed.
1086. London; great part of the city destroyed.
1212. London; great part of the city destroyed.
1666. London; Great Fire, 2–6 September; 436 acres; loss, $50,000,000.
1794. London; 650 houses burnt; loss, $5,000,000.
1812. Moscow fired, 14–20 September; loss, $150,000,000.
1835. New York, 16 December; loss, $15,000,000.
1842. Hamburg, 5–7 May; loss, $35,000,000.
1845. New York, 20 July; loss, $7,500,000.
1861. London, Tooley Street, 22 June–22 July; loss, $10,000,000.
1871. Paris, Communist outrages in May; loss, $150,000,000.
1871. Chicago, 8–10 October; 2,124 acres; loss, $200,000,000.
1872. Boston, 9–10 November; loss, $75,000,000.
1903. Chicago, 30 December, Iroquois Theatre; 531 lives lost.
1904. Baltimore, Md., 7 February; loss, $70,000,000.
1904. New York, steamer *General Slocum*, June, nearly 1,000 lives lost.
1906. San Francisco, Cal., 18–21 April; earthquake and fire; loss about $300,000,000.

FIREWORKS. See Pyrotechnics.

FIRING MACHINES, blasting batteries, electric blasting machines or exploders are electric generators which are used in firing charges of explosives, in blasting and in military and naval operations. Broadly speaking, there are three types: (1) In which the current is induced in coils of wire surrounding the poles of a permanent magnet, by suddenly detaching a soft-iron armature therefrom; (2) in which a coil-wound armature is rotated between the poles of a permanent magnet; (3) in which a coil-wound armature is rotated between the poles of an electro-magnet as in an ordinary dynamo. It has been found advantageous in practice to construct the dynamo-electric machines on the series method of winding, that is, the field-magnet coils, armature and external circuit (which in this case is the firing-line) are joined together in series. These machines are operated by cranks or by means of racks and pinions, many mechanical arrangements having been devised by which to secure the continuously accelerated motion and automatic switch-off which is desired. The general principle upon which the dynamo-electric machines work is that an armature, rotated between the poles of an electromagnet, has set up in its coils a feeble electric current, due to the magnetization produced by the residual magnetism in the iron. By continuing rotation (with the firing-line short-circuited) the weak current thus started passes round the field-magnet coils, increases the intensity of the field, and, consequently, the volume of current in the armature. This gradual increase or building up of the current goes on, until the maximum capacity of the machine is reached. At the limit of magnetic saturation, the short circuit previously existing is automatically broken and the whole available energy is switched on to the firing-line, through the binding posts or terminals on the side or top of the machine, to which the leading wires are attached. Machines are rated in the market at the full number of detonators which a machine of that pattern will fire, but, to ensure freedom from "miss-fires," a machine should never be worked up to its rated maximum capacity. The diameters of the leading wires should vary with their lengths, thus for distance up to 600 feet No. 16 B. W. G. (0.065 inch) wire should be used, for 800 feet No. 14 (0.083 inch) and for 1,000 feet No. 13 (0.095 inch). To prevent accidental explosions, it should be the invariable rule, that the leading wires are not attached to the binding posts of a firing machine, until all other preparations for firing are completed and everyone has got to a safe distance from the blast or mine; and it should be also the invariable rule that the leading wires are detached from the machine as soon as the blast has been fired.

FIRISHTAH, fē-rēsh'tā, more properly **MOHAMMED KASIM,** Persian historian: b. Astrabad, about 1550; d. about 1612. He went to India, and was for some time the tutor of a native prince. He wrote a 'History of the Mohammedan Power in India till the Year 1612,' which is the best yet written on the period which it embraces.

FIRMAMENT, in ancient astronomy, the eighth heaven or sphere, with respect to the seven spheres of the planets which it surrounds. It is supposed to have two motions, a diurnal motion, given to it by the *primum mobile* from east to west, about the poles of the equator; and another opposite motion, from west to east, which last it finishes, according to Tycho, in

25,412 years; according to Ptolemy, in 36,000; and according to Copernicus, in 25,800; in which time the fixed stars return to the same points in which they were at the beginning.

FIRMAN, fĕr'man or fĕr-män', in Turkey, any decree issued by the Porte and authenticated by the sultan's own cipher or signet. Each of the ministers and members of the divan has the right of signing firmans relative to the business of his own department, but only the grand vizier is authorized to place at their head the cipher containing the interlaced letters of the sultan's name, which alone gives them force. A decree signed by the sultan's own hand is called hatti-sherif. The name firman is also applied to a passport issued either by the Porte or a pasha, enjoining the subordinate authorities to grant protection and assistance to the traveler in whose favor it is granted. (See Turkey). In India, a written permission to trade is called a firman.

FIRMIAN, fĕr'mē-ăn, **Karl Joseph,** Count, Austrian statesman: b. Deutschmetz, Tirol, 1716; d. 1782. He received his education at Erthal, Innsbruck, Salsburg and Leyden. In 1753 he was appointed ambassador to Naples and three years later became governor-general of Lombardy. He was a liberal patron of artists and scholars, including Winckelmann, Angelica Kauffmann, etc. He established several libraries and made his own library accessible to scholars and investigators. This was the celebrated Bibliotheca Firmiana of 40,000 volumes, which was afterward in great part incorporated with the Brera Library of Milan.

FIRMICUS, Maternus Julius, Latin writer of the 4th century A.D. In or about 346 he wrote a work entitled ‘De Erroribus Profanarum Religionum,’ which is still extant. In it he attacks the objects of worship of the Oriental cults and the mysteries. His ‘Matheseos Libri VIII’ formulates a complete astronomical theory interfused with the Neoplatonic spirit. The first named work is preserved in a Palatine manuscript in the Vatican library. It was first printed at Strassburg in 1562, and has been reprinted several times. The best edition is that by Kroll, Skutsch and Ziegler (2 vols., 1897, 1913). The work on astronomy was first printed by Aldus Manutius in 1501 and has been frequently reprinted. Consult Teuffel, ‘Geschichte der römischen Litteratur’ (6th ed., Leipzig 1911); Jordan, ‘Geschichte der altchristlichen Litteratur’ (ib. 1911).

FIRMINY, fĕr'mē'nē, France, town of the Department of Loire, eight miles southwest of Saint Etienne, with which it is connected by rail. It has important coal mines which have been worked since the 14th century and also manufactories of iron and steel goods, including railway equipment, machinery and cannon. Fancy woolen hosiery is also manufactured. Pop. 19,580.

FIRN, the German equivalent for Névé. See Névé.

FIROZPUR, fē-rōz-poor', or **FEROZEPORE,** India, town, Punjab, three miles from the southeast bank of the Sutlej River, capital of a district of the same name. It has a large arsenal and has a trade in grain and manufactures of cotton. Pop., including the military cantonments two miles south of the city, 49,341. Ferozepore is also the name of a town in Gurgaon district, Punjab. Pop. about 7,000.

FIRST AID, the term applied to a plan for popularizing the knowledge of certain simple measures for the relief of the injured and distressed. The movement began with the formation of the Saint John's Ambulance Association, London, England, in 1877, and was shortly followed by the rise of similar organizations in the United States, lectures and practical class demonstrations being established. Instant application is necessary in many cases of sudden illness or accident if remedial measures are to succeed. Thus a slight knowledge of the course of arteries and of means for compressing them will enable one to stay a fatal flow of blood. Antidotes for poison rapidly lose value as time elapses. The resuscitation of the drowning is largely a matter of persistence in artificial respiration. General knowledge of the cleansing of wounds is all-important. This knowledge is now widely used in armies and among people most liable to witness accidents, as trainmen, etc., circulars of instruction and packets containing the most necessary articles for dressing wounds being often furnished by those in authority.

FIRST-BORN (Heb. *bekor,* Gr. *prōtotokos,* Lat. *primogenitus*), in scriptural use, signifies the first male offspring, whether of man or of other animals, due to the Creator by the Mosaic law as a recognition of his supreme dominion. The first-born male, whether of men or of animals, was devoted from the time of birth to God, and the first-born male child had to be redeemed one month after birth by an offering not exceeding in value five shekels of silver (Exod. xiii, 13), provided the child lived longer than that period. The first-born male of animals also, whether clean or unclean, was equally regarded as devoted to God. By the Mosaic law primogeniture had certain privileges attached to it, the chief of which were the headship of the family and a double portion of the inheritance. Among other nations considerable variety existed as to the succession of children to the inheritance of their parent. See Inheritance; Primogeniture.

FIRST CENTURY. The most important series of events for all after history in the 1st century of our Christian era are those connected with the Lord Jesus Christ. They took place almost without any inkling on the part of the generation in which they occurred except for the few who were immediately in contact with Him. Christ, the Son of God, was born 4 B.C. and died 29 A.D., the anomaly of His birth date being due to the fact that while the Christian era was meant to begin from the year of Christ's birth, by a mistake in chronology made at the time when the new calendar was introduced (516) His birth was placed four years after it really occurred. He worked as a simple carpenter until He was 30 years of age and then preached His sublime doctrines in Palestine until seized and put to death for political reasons by the Jews. His crucifixion took place in the year 29, on Friday, April 3d, at 3 P.M. His followers were first called Christians at Antioch 10 years later (40). He had chosen 12 fishermen — poor, ignorant, unrefined — whom He made “fishers of men” for His kingdom upon earth. Before the end of the century, His doctrines were not only known throughout the East, but also in Rome, in south France, in Spain, in the islands of the Mediterranean, in Africa, and they have continued to be the most absorbing interest of men ever since.

When Christ was born, Octavius, the great nephew and adopted son of Julius Cæsar, had reigned over the Romans for more than a quarter of a century with the titles of Augustus and Imperator. Augustus is one of the supremely great men of history. He succeeded in ruling the immense Roman Empire with such wisdom and moderation that the Augustan Age is rightly looked upon as "an oasis of security in the desert of turmoil" of human history, "in which it was both appropriate and fortunate that the great founder of our religion, Jesus Christ, should be born." (Oscar Browning). The great founder of the Roman Empire was unfortunate in his domestic relations but particularly happy in the choice of men whom he gathered around him both for administrative and cultural reasons. Historians and poets have rightly made the Augustan Age an object of envy and admiration to posterity and the term has become a commonplace in all languages. The fourteen years of his reign in the Christian era are particularly happy. Augustus was engaged in cementing the Empire and adorning his capital. He quite literally found Rome brick and left it marble. He gave an example in this respect that was finely followed by many of his successors.

The one serious set back of Augustus' reign was also one of the most important events of this century for after history. This was the defeat (9 A.D.) of a great Roman army under Varus, the governor of the Germanic province, by Arminius (Hermann), a German leader, who had been trained in the Roman military service. This defeat at the forest of Teutoberg prevented Germany from becoming a Roman province. Arminius' victory deserves for that reason to be counted one of the decisive battles of history; that it was no accident his subsequent successes against the Romans show. He was defeated by Germanicus, 16 A.D., but succeeded in maintaining the independence of the right bank of the Rhine. Roman dominion here would surely have changed the history of the world very considerably for it would almost inevitably have prevented the invasion of England by the Saxons and Angles and perhaps even kept the Northmen much more within their own confines. Arminius was indeed a great German patriot who more than any other succeeded in gathering the Germans about him for united resistance against the Romans and he continued to make head against them until he fell by treachery 21 A.D.

Augustus was the second of the 12 Cæsars whose names have probably been better known to mankind ever since than any other group of men. They were Julius Cæsar, Augustus and Tiberius, Caligula, Claudius and Nero, who represent the Julian family by nature and adoption. These were followed by the three military Cæsars, Galba, Otho and Vitellius, who together reigned only for a year and a half, throned by the sword and perishing by it. Next came the three Flavian emperors, Vespasian, Titus and Domitian. Domitian died in 96, to be followed before the end of the century by Nerva and Trajan who began a happy era for Rome. There is probably no more difficult problem in history than to estimate properly the true character of the Cæsars. Even the character of Augustus is in some dispute, and all of his immediate successors, after passing through a period of historical condemnation of the bitterest kind, are now vindicated to a considerable extent. The contemporary sources of their history are Suetonius, who loved to delve in all that is worst in human nature, Tacitus who was a politician, and Juvenal the satirist.

Tiberius suffered under the misfortune of being compared to the great Augustus. He was a lover of solitude which rendered him unsuitable for his position but he seems to have been a great ruler, though with many personal faults. Caligula was the youngest son of Germanicus. His reign is a typical example of what may happen when inheritance dictates the choice of a ruler for he proved to be quite insane and a very monster of cruelty. He was murdered by an officer of the Prætorian Guard and then the army dictated that Claudius the uncle of Caligula, and brother of Germanicus, should be chosen as Emperor and the Senate had to confirm their choice. Claudius in person led the Roman army in Britain and made that a Roman province, and he added Mauretania, Lycia and Thrace to the Empire and did much for Rome, making the harbor of Ostia and draining the neighborhood. Claudius was even more unfortunate than Augustus in his domestic life and was poisoned by his last wife, Agrippina, who made him adopt her son, Nero, as his successor, while his first wife Messalina, goes down in history, proverbial for wickedness. Nero is one of the worst abused men of history, and yet probably does not deserve it all. In the first part of his reign he accomplished much for the Roman people. Then a strain of madness came over him and he committed some of the worst crimes. He initiated the persecution of the Christians and whether he set Rome on fire or not is uncertain, but he took advantage of the fire to rebuild the city much more safely and substantially and in more magnificent style. The Greeks sincerely mourned his death for he had a fine appreciation of their art and literature and seems to have possessed no mean artistic talents in music and in acting, though of course his desire to exhibit these was counted a deep stigma on his dignity at that time.

The three military Cæsars were succeeded by Flavius Vespasian whose sons, Titus and Domitian followed him on the throne, as the Flavian line. Vespasian was chosen Emperor by the Eastern troops. He had to take Rome by siege, during which the ancient temple on the Capitoline was burned. The disorder in the choice of emperors for several years led to insurrection among the subject peoples, but these were suppressed by Vespasian firmly and completely. When Vespasian was elected emperor, he was on an expedition against the Jews who had declared their independence of Rome (67) and his son Titus was left in command in Palestine. Titus captured the city and destroyed the Jewish temple (70), which led to the dispersion of the Jews throughout the

the world, and undoubtedly helped in the propagation of Christianity. Vespasian proved a great emperor who brought peace and security to Rome. He built the Coliseum as well as a number of other magnificent buildings and established a system of schools with regularly paid professors. In 79 he was succeeded by his son Titus who had been associated with him in the government. Titus made himself the most loved ruler that Rome ever had. From him comes the expression «Count that day lost on which no good action has been done.» Famine, pestilence, earthquake, the eruption of Vesuvius which destroyed Pompeii and Herculanæum as well as a severely destructive fire at Rome lasting three days occurred during his reign and Titus had abundant opportunities to exercise his benevolence and took them finely. He was given the title of «the Love and Darling of the human race.» Unfortunately he died at the early age of 41 after a reign of 12 years to be succeeded by his brother Domitian. Titus was the first son of a father to succeed to the Empire as Domitian was the second but with very unlike results. After a worthy beginning of his reign, he became as cruel as any of the Claudian emperors and, with inordinate vanity, insisted on being called not only Lord, *Dominus*, but God, *Divus*. He came after a time to delight in murder, and when at last he himself was murdered by his wife (96), all Rome was relieved. Domitian, however, enriched the capital with some of its finest monuments — the Temple of Vespasian in the Forum, the Arch of Titus for his brother's victory over the Jews and the Palace on the Palatine still a subject of wonder.

The Golden Age of Latin literature was finished before the Christian era began. Virgil, Horace, Catullus, Tibullus, Propertius, all being dead, though Ovid and Livy lived over into the 1st century even longer than Augustus himself, both dying in 17 A.D. What has been called the Silver Age marks this century as a great though not one of the greatest periods in the history of literature. The important names in it are Seneca, Tacitus, Juvenal, Quintilian and the Plinys beside whom deserve to be mentioned Lucan, Persius, Martial and Petronius. Tacitus is often spoken of with Herodotus and Thucydides as one of the three greatest of historians and there is no doubt that he had a wonderful power of penetrating human motives and a marvellous condensation of style, but the question whether the satirist and politician did not eclipse the historian in him has come to be discussed more and more in recent years. Quintilian is one of the first successful men of letters in history, who rose to wealth and honor through literature; Juvenal is perhaps the greatest of satirists who ever lived, though Martial in his Epigrams has given a fuller picture of the characteristic frivolous life of Rome at the end of the 1st century. Roman literature of the Golden Age had much less of native originality and of the national character than that of the Silver Age. Greek models were more consciously imitated in the first period but the time of the Cæsars with its tyranny and lack of true national spirit could not be favorable to the growth of a really great national literature. Livy's fervid belief in the greatness of Rome so beautifully expressed at the beginning of the century had little chance to be lived under the Claudian Emperors, though the Flavian era and the beginning of the times of the Spanish Cæsars at Rome gave the opportunity for the Silver Age literature which has always influenced deeply all subsequent periods of conscious literary development.

One of the characters in the political history of this 1st century is almost more important even than the emperors. This is Germanicus, the nephew and adopted son of the Emperor Tiberius. He was the son of Drusus who had proved such an active leader against the western barbarians. Germanicus hastened from Gaul in 14 A.D. to quell a mutiny which had broken out on the news of the death of Augustus in a Rhenish camp. He found so much disaffection among the Roman soldiers that he felt that active service would be the only thing to restore anything like loyalty. He won a series of triumphs and salved the Roman feelings by paying funeral honors to the dead whose bones were the mute but emphatic testimony to the defeat of Varus by Arminius, though a little later, Germanicus himself received a set back from Arminius. His fleet was lost in a storm, one of his lieutenants was defeated, and even Germanicus himself, after immense preparations, was compelled to withdraw from the enemy so that Tiberius, thinking it better not to risk Roman prestige further, recalled him to bring order out of the confusion that had arisen in the East. Even his incomplete defeat of the Germans endeared Germanicus to the Roman people and his title of honor constantly reminded them of their vindication, because they had taken the destruction of the legions under Varus to heart. When Germanicus died in the East at the early age of 34, the Romans were quite willing to listen to stories that he had been poisoned. There is no evidence for that however and Germanicus is just one of the early cases in history in which untimely and unexpected death was attributed to poisoning. There are too many affections which may cause unexpected death in a comparatively short time, or by lingering illness in spite of all treatment, for any but the most direct proof of poisoning to be accepted in history. In spite of the popular impression to the contrary, there are very few poisons that do not give symptoms that will readily reveal their presence. Germanicus' remains were brought back to Rome in triumph. Later his wife, suspected of plotting to have the imperial throne bequeathed to one of her sons, was banished by a decree of the Senate and she and her son died of hunger. The second son, Drusus, was put to death on a similar charge of ambition and only Caius, afterward called Caligula, remained, but he became the successor of Tiberius who died at 78 at Misenum (37).

Another character of the 1st century whose reputation among scholars at least has been very well preserved in Celsus. His works are an index of the scientific interest of the time. Though probably not a physician, he wrote a work on medicine, 'De re medica.' He lived about the time of Christ. For the purity and precision of his Latin he has been given the title of 'Cicero Medicorum.' With the exception of the *Papyrus Ebers*, Celsus' is the oldest medical document after the Hypocratic writings. Hypocrates is the only one of the 72 medical authors whom Celsus mentions whose writings have come down to us. The interest in him can be understood then. His works are full of anticipations of modern developments in medicine and surgery that were supposed to be novel. Surgery evidently had developed marvellously about that time and surgical instrumentation in particular was highly specialized. Over 200 different surgical instruments have been found at Pompeii which was buried 79 A.D. Unfortunately, we know almost nothing of Celsus himself.

Another important writer on the sciences related to medicine who was very often quoted in the after time was Dioscordies, a Greek army surgeon in the service of Nero, called the father of the materia medica and the first to write on medical botany and applied science. Aretæus the Cappadocian who also lived under Nero, was a wonderful observer and "easily the most attractive medical author of his time." (Garrison). The natural History of Pliny the Elder (23–79 A.D.) is a compilation of nearly all that was known of the biological sciences, geography and mineralogy up to his time. While he is thus so largely a borrower from others, his zeal for first hand information is well illustrated by the fact that he perished in the eruption of Vesuvius which destroyed Pompeii, while making a determined effort to approach near enough to the volcano to be able to see for himself actually what was happening. The letters of his son, Pliny the Younger, show how wide was the interest of the educated Romans of the time. Their interests are so like our own as to be often a commentary on the morning paper.

Manifestly the Romans were deeply interested in science and above all in what related to human health. This makes the fact that Luke the Evangelist was a physician all the more significant, for as Harnack has shown, the Gospel written by him contains many of the technical medical terms of the time, and therefore would have an especial appeal to the educated classes. There is some question as to whether Luke was not a relative of Gallio, the proconsul of Achaia before whom Paul was tried at Corinth for Lucanus, his Latin name, is not Greek at all but a surname in the great family of the *gens Annæa* to which Seneca, Gallio and Lucan all belonged. Philippi, where Luke was stationed, was a Roman colony. Perhaps this accounts for some of the strongly Christian character of Seneca's writings. The fact that Christ had devoted Himself so wholeheartedly to the relief of suffering and the cure of the diseased among mankind made it all the more striking that a physician, learned in the medical lore of his time, should describe in medical terms the miraculous healings worked by the Lord, and thus give them the stamp of his approval.

After extensive controversy during the 19th century as to whether Saint Peter was ever at Rome, there seems to be now no doubt left in the minds of most historians that both Saint Peter and Saint Paul spent some years in the preaching of Christianity at the capital of the Roman Empire. Saint Peter seems to have been in the city with a considerable interval on two separate occasions and there is a universal tradition as to his 25 years Pontificate in Rome. He, together with Saint Paul, were victims of the persecution under Nero (67 or 68), Saint Paul as a Roman citizen, being put to the sword, while Saint Peter was crucified, head downward, according to tradition at his own request, not deeming himself worthy to die as did his Divine Master. The scene of his martyrdom was the Vatican hill in the Jewish quarter of the city, where in Constantine's time, two centuries and a half later, a great church in his honor was erected, and where Saint Peter's and the Vatican still stand.

Rome was sadly in need of Christianity when these great doctrines which gave new values to life were first preached. An intense selfishness combined with utter disregard for others had come to the Roman people just in proportion as their city became the centre of the world of the time. The more one knows of the intimate details of the social life of this 1st century, the more the need of Christianity is recognized. Until recently, history has to a great extent been limited to the story of the wars and politics of older periods, and we have failed to know the people. With the development of social history, this Roman chapter of the 1st and 2d centuries bears a striking resemblance to the history of other periods when a high degree of civilization, so-called, followed wealth and luxury. The all-important thing in the Rome of the 1st century was to make money. A number of men became immensely wealthy. Some five ways of making large fortunes at this time have been enumerated. The first was by insurance, and speculation in connection with it, for the Rome of the period was rather flimsily built, the people living, or rather sleeping, for they lived mainly out of doors, in rather confined quarters in apartment houses of five or more stories which, according to law, had to be built with streets all round them, and were therefore called *insulæ* (islands). The second was by speculation. It is said that Cicero himself the attorney of the "big interests" of his time at Rome, lost his fortune several times because of his tendency to speculate. The Forum was full of brokers' offices, and foreign exchange, because of the many different kinds of money current in the Empire, was a favorite object of speculation. The third way of making money was by cornering foodstuffs and selling them dear. Rome was a very large city of some two million inhabitants which had grown up in a few generations and had to be fed from a distance, the grain crops being grown down on the North African coast. This facilitated food hoarding and profiteering. The fourth way of making money was by speculation in land. Rome grew rapidly out over the estates surrounding it, and these were split up into parcels and sold at great profit. The fifth way was by corruption in politics, usually not in Rome itself, but out in the provinces and by the farming of taxes, and other abuses. There are surprising similarities with later times in all this.

The money having been made very much as in our day, it was spent largely as our generation spends. Wealthy Romans had a home in the city, but spent comparatively little time in it, for they had a villa down near Naples, where they passed the winter months, a house at the seashore for the summer; some of them went up to Lake Como near the foothills of the Alps for the early fall, and only appeared in Rome for a brief fashionable winter season. They ate 12 and 15 course dinners, taking Roman punch, made from snow brought down from the Alps, about the middle of the dinner so as to drive away the blood from the stomach for the moment and then have it come back by a reaction which produced a renewal of appetite. They affected all sorts of delicacies brought from long distances, indulged in the pleasures of the table, and dreading indigestion very much, sometimes relieved their stomachs after a heavy dinner by tickling their throats, and then went back to eat a more simple meal. Their pleasures were the baths and the amphitheatre. Here they saw gladiators fight with each other to the death, or with wild animals at great risk and sometimes fatal results, or saw wild animals kill each other. It is said that the luxurious Romans received an especially poignant pleasure from seeing the Christians thrown to the lions. They had not become savages but were only wealthy sybarites thinking but of themselves and referring everything to their own feelings regardless of others. Divorces became extremely common and could be secured for even trivial reasons, children grew to be fewer in the families; the men lost courage and the women lost virtue and the beginning of the end of Rome was very clear. There were to be periods as under the Spanish Cæsars, which began just as the 1st century closed when degeneration and decadence seemed to be held up for a time, but the seeds of dissolution had been sown and Rome's destiny was upon her.

James J. Walsh,
Author of 'The Thirteenth the Greatest of Centuries,' etc.

PRINCIPAL EVENTS OF THE FIRST CENTURY.

A.D.
9. Arminius, German leader, defeats the Roman army under Varus.
14. Augustus, Roman emperor, dies. Tiberius succeeds.
16. Germanicus defeats Arminius.
21. Arminius treacherously slain.
25. Pontius Pilate becomes governor of Judea.
29. Crucifixion of Christ at Jerusalem.
37. Tiberius dies. Caligula, youngest son of Germanicus, becomes Roman emperor.
41. Caligula, insane tyrant, murdered. Claudius, his uncle, succeeds.
51. Caractacus, British king, defeated in great battle, carried in chains to Rome. Claudius poisoned by Agrippina. Nero becomes Roman emperor.
61. Boadicea, British queen, defeats the Romans. Conquered soon after by Suetonius, Roman governor of Britain, she kills herself.
64. Nero persecutes the Christians. Sets fire to Rome.
65. China, under Ming-ti, sends an embassy to India, who on their return introduce Buddhism into China.
66. Revolt of the Jews.
67. The Christian apostles Paul and Peter executed at Rome.
68. Nero kills himself.
69. Galba, the penurious, slain. Otho, the prodigal, stabs himself. Vitellius, the debauchee, assassinated. Vespasian becomes emperor of Rome.
70. Destruction of Jerusalem by Titus, surnamed "the good."
79. Vesuvius in eruption overwhelms Herculaneum and Pompeii. Titus becomes Roman emperor.
81. Domitian, last of the "Twelve Cæsars." Julius Agricola, governor of South Britain, conquers northward to the Grampian Hills.
85. Agricola sails around Britain which he discovers to be an island.
95. Persecution of the Christians.
96. Domitian murdered by his wife. Nerva becomes Roman emperor.
98. Trajan succeeds.

FIRST-FOOTING, a Scottish custom still existing. Late in the evening of Hogmonay (31 December) in each year thousands of the common people assemble in the vicinity of the Edinburgh Tron Church, to ascertain on good evidence when the new year commences. When the clock is about to strike 12 they cheer so loudly that the strokes are not heard. Instantly that it has finished, they depart for the purpose of first-footing; that is each one tries to be the first person that year to cross the threshold of his friend's house and wish him the compliments of the season. On such occasions also not a few are accustomed to drink their friends' health at the manifest risk of their own. It is considered unlucky to go into a house empty-handed, and good luck is supposed to attend the resident whose «first foot» is dark-complexioned.

FIRST-FRUITS and **FIRSTLINGS** are terms of the Mosaic and Jewish law, denoting respectively those portions of the fruits of the earth and of the increase of live stock which were to be offered to the Lord. (For First-fruits consult Exod. xxii, 29; Num. xviii, 12 etc.; for Firstlings, consult Exod. xiii, 12; Num. xviii, 15, etc.). A custom which had its rise in the Roman Catholic Church as early as the 6th century was that men ordained to ecclesiastical offices made to the bishop who ordained them an offering of some portion of the first year's revenue of the office. In course of time the claim of the See of Rome to the whole of the first year's income of a bishopric or an abbey or other office or benefice was recognized and enforced. When in 1531 King Henry VIII forbade the payment of this tax to the papal see by his subjects, the amount of the first-fruits annually forwarded from England to Rome was about £3,000. When Henry was made supreme head on earth of the Anglican Church, the tax of the first-fruits was still exacted, but the proceeds were turned into the royal treasury. Such was the disposition made of the first-fruits in England till in 1704 Queen Anne, for herself and successors, relinquished the income from first-fruits and other imposts on the profits of spiritual preferments and, under an act of the Parliament, formed this income into a fund for the relief of clergymen holding poor livings: this is «Queen Anne's Bounty.» The official name of first-fruits is *Annates*, or *Annalia*, from *annus*, year; they are also called *primitiæ*, the Latin equivalent of first-fruits.

FIRTH, Charles Harding, English historian: b. Sheffield, England, 16 March 1857. He was educated at Clifton and Oxford and since 1883 has devoted his attention to literary work and teaching at Oxford, having been lecturer at Pembroke College there 1887–93, and since 1904 regius professor of modern history at that university. He has published 'The Clarke Papers' (1891–1901); 'Scotland and the Commonwealth' (1895); Scotland and the Protectorate' (1899); 'Oliver Cromwell' (1900); 'Cromwell's Army' (1901); 'Naval Songs and Ballads' (1907); 'The Last Years of the Protectorate' (1909); 'The House of Lords during the Civil War' (1910), etc.

FIRTH, Mark, English steel manufacturer: b. Sheffield 1819; d. 28 Nov. 1880. In 1849 with his father and brother he established in

Sheffield the great Norfolk steel works, whose specialty soon became the manufacture of steel ordnance. He was a munificent benefactor to his native town, his gifts including almshouses (1869), a public park of 36 acres (1875) and the Firth College (1879) in connection with university extension, with an endowment of £5,000 a year.

FIRTH, or **FRITH,** in Scotland, the name of deep inlets of the sea. Firths are in many respects similar to the Norwegian fiords.

FIRTH OF FORTH. See Forth.

FIRUZ, the name of the three rulers of Persia. Firuz I, who reigned from 78 to 103 A.D., was of the Arsacide dynasty and has been identified with Pacorus II of the classical writers. Firuz II (Peroz) ruled from 457 to 484. He was of the Sarsanide dynasty. He was on friendly terms with the Romans, but lost his life on an expedition against the Ephtalites or White Huns. Firuz III, also a Sarsanid and the last of the line, was expelled from Persia by the Mohammedans in 641 and sought refuge with Kao-Tsung, emperor of China, who tried to restore him to his throne.

FIRUZ SHAH I, Rukn ud-Din, Mohammedan king of Delhi, who succeeded to the throne in 1236 A.D. He was deposed after a reign of seven months and was succeeded by his sister, Firuz Shah II, Jalal Ad-Din, sultan of Delhi, founder of the Khalji dynasty and one of the noblest of Mohammedan rulers. He succeeded to the throne in 1290 A.D. and was famed for his humility and clemency even to his greatest enemies. He campaigned against the Mongols in 1292 and four years later was assassinated by his nephew Ala-ad-Din. Firuz Shah III, king of Delhi: b. 1296; d. 1388. He succeeded to the throne in 1351 and enjoyed a quiet and prosperous reign. He abdicated two years before his death.

FIRUZABAD, fē-roo'zą-bad, Persia, town in the province of Fars, 70 miles south of Shiraz, on the River Khoja. The town is surrounded by a mud wall and ditch. To the northwest are the ruins of the ancient town and of a large building called the fire-temple of Ardashir. The ancient city was destroyed by Alexander the Great, who built a dam across the river at the gorge where it leaves the plain, where the city was located, thus submerging the city. The lake remained until the 3d century when it was drained by Ardashir. He built a new city which he called Gur. The name was changed in the 5th century by Firuz II, who built here a famous palace 342x178 feet. It was a combination of Mesopotamian, Byzantine and Roman architecture. Pop. 3,000.

FISC, the public treasury. In Roman times the term at first designated the emperor's private purse, but later was used to designate the imperial treasury, and in the latter sense is used in most modern countries. In law it is considered a juristic person. Consult Sohm, 'Institutes of Roman Law' (2d ed., Oxford 1901).

FISCAL LANDS, lands, among the Franks, set apart for the use of the sovereign to support his dignity and to give him the means of rewarding merit or valor.

FISCHART, fish'ärt, **Johann,** German satirist: b. Mainz, between 1545 and 1550; d. Forbach, about 1590. As a satirist he is the most unrestrained of his age, inexhaustible in droll, humorous and witty thoughts, not seldom guilty of equivoque and obscenity, intimately acquainted with the follies of his age, and never at a loss whether to ridicule or lash them. He treats the German language with the greatest freedom, coining new words and turns of expression without any regard to analogy, and displaying, in his most arbitrary formations, erudition and wit. In the broad comic and burlesque he is not to be surpassed, and even in his most satirical effusions there is an honesty and good nature always observable. His most celebrated works are a rifaccimento of the Gargantua of Rabelais, first printed in 1575; 'Das gluckhaft Schiff von Zürich' (The Lucky Ship of Zürich) (1576); 'Aller Praklik Grossmutter' (1572); 'Eulenspiegel Reimensweiss' (1572), and several others. We find in Fischart the first attempt at German hexameters.

FISCHBACH, fĭsh'bäh, **Friedrich,** German textile designer: b. Aix-la-Chapelle, 1839; d. 1908. He received his education at the Berlin Academy of Industrial Design. In 1862 he removed to Vienna where he followed the profession of decorator and designer. He became teacher of ornamentation at the Royal Academy, Hanau, in 1870, and from 1883 to 1888 served as director of the Industrial Art School of Saint-Gall. In 1889 he removed to Wiesbaden. He founded many societies for the advancement of industrial art and by his work exercised a great influence on textile designing in Germany. In 1909 the Metropolitan Museum of Art, New York, acquired his collection of antique embroideries and fabrics. He published 'Ornamente der Gewebe' (1874–81); 'Geschichte der Textilkunst' (1883); 'Südslavische Ornamente' (2d ed., 1872); 'Album für Stickerei' (130 patterns in gold and colors, 1872; 1880); 'Neue Muster für Stickerei und Häkelarbeiten' (3 series, 1880–83); 'Stickereimuster' (1888); 'Häkelvorlagen' (1889); 'Weissstickereivorlagen' (1892); 'Die wichtigsten Webemuster bis zum 19ten Jahrhundert' (1900).

FISCHER, fĭsh'ẽr, **Abraham,** South African statesman: b. Green Point, Cape Town, 1850; d. 1913. He was educated at the South African College, became interested in the politics of the Orange Free State and in 1878 became a member of the Volksraad. In 1896 he became a member of the Executive Council of the Volksraad and took part in many colonial and interstate conferences. He headed a joint deputation from Transvaal and Orange Free State to Europe and America during the South African War. From 1907 to 1910 he was Premier of the Orange River Colony and in the latter year became Minister of Lands in the new Union of South Africa government. He was made Privy Councillor in 1911 and became Minister of the Interior and Lands in 1912.

FISCHER, Bernhard, German bacteriologist: b. Coburg, 1852. He was educated at the University of Berlin, received the degree of M.D. in 1875, and went to Egypt and India as member of the German Cholera Commission. In 1889 he was a member of the Plankton Expedition and 10 years later became professor at the University of Kiel. There he also became head of the Institute of Hygiene. He became generally known for his classification of bacteria. His ‘Structure and Functions of Bacteria’ (2d ed., 1900), is the standard in its field.

FISCHER, Emil, German chemist: b. Euskirchen, 1852. After studying at Strassburg, in 1879 he was appointed professor extraordinary at the University of Munich and became professor of chemistry at Erlangen 1882, filling a similar chair at Würzburg 1885. He was appointed professor of organic chemistry at the University of Berlin 1892, succeeding the celebrated A. W. Hofmann; and in 1902 received the Noble prize for chemical research. His researches were along the lines of synthetic sugar, in which field he was a pioneer; and he also made significant investigations of the composition of the «purine group,» the polypeptides (synthetic proteids) and the depsides. He is author of ‘Anleitung zur Darstellung organischer Präparate’ (Eng. trans. by Stanford, 1909), a popular text-book; numerous papers which have since been collected into book form, and ‘Die Chemie der Kohlenhydrate und ihre Bedentung für die Physiologie’ (1894), and ‘Chemical Research in its Bearings on National Welfare’ (1912).

FISCHER, Ernst Kuno, koo'nō, **Berthold,** German historian of philosophy: b. Sandewalde, Silesia, 23 July 1824; d. Heidelberg, 5 July 1907. He studied at the universities of Leipzig and Halle and in 1849 became a lecturer on philosophy at the University of Heidelberg. However, he was interdicted from teaching philosophy at Heidelberg in 1853; but after filling professorships in Berlin and Jena, had the satisfaction of being called to the chair of philosophy and history of modern German literature at Heidelberg in 1872. He was a brilliant lecturer and possessed a remarkable gift for clear exposition. His fame rests primarily on his work as a historian and commentator of philosophy. As far as his philosophical views were concerned, he was, generally speaking, a follower of the Hegelian school. His writings in this direction, especially his interpretation of Kant, involved him in a quarrel with A. F. Trendelenburg, professor of philosophy at the University of Berlin, and his followers. His greatest work was his ‘Geschichte der Neueren Philosophie’ (6 vols., Stuttgart-Mannheim-Heidelberg 1854–77; new edition, Heidelberg 1897–1901), written in the form of brilliant monographs on Descartes, Kant, Fichte, Schelling and other great philosophers down to Schopenhauer. He also published ‘Diotima. Die Idee des Schönen’ (Pforzheim 1849); ‘Die Interdict meiner Vorlesungen’ (Mannheim 1854); ‘Die Apologie meines Lebens’ (Mannheim 1854); ‘System der Logik und Metaphysik oder Wissenschaftslehre’ (Stuttgart 1852); ‘Franz Baco von Verona’ (Leipzig 1875; translated into English by J. Oxenford, London 1857); ‘Kants Leben und die Grundlagen seiner Lehre’ (Mannheim 1860); ‘Akademische Reden: J. G. Fichte; Die Beiden Kantischen Schulen in Jena’ (Stuttgart 1862); ‘Lessings «Nathan der Weise»’ (Stuttgart 1864; translated into English by E. Frothingham, New York 1868); ‘B. Spinozas Leben und Charakter’ (Heidelberg 1865; translated into English by F. Schmidt, Edinburg 1882); ‘Shakespeares Charakterentwickelung Richards III’ (Heidelberg 1868); ‘Über die Entstehung und die Entwickelungsformen des Witzes’ (Heidelberg 1871); ‘Kritik der Kantischen Philosophie’ (Munich 1883; translated into English by W. S. Hough, London 1888); ‘Goethe-Schriften’ (8 vols., Heidelberg 1888–96); ‘Kleine Schriften’ (Heidelberg 1888–98); ‘Schiller-Schriften’ (2 vols., Heidelberg 1891); ‘Philosophische Schriften’ (3 parts, Heidelberg 1891–92). Other translations of his works are Mahaffy, J. P., ‘A Commentary of Kant's «Critic of Pure Reason»’ (London-Dublin 1866); Gordy, J. P., ‘Descartes and his School’ (New York 1887). In honor of his 80th birthday, celebrated in 1904, there was published by O. Liebmann, W. Wundt, T. Lipps and others, ‘Die Philosophie im Beginn des 20. Jahrhunderts. Festschrift für Kuno Fischer’ (Heidelberg 1907). Consult Alexander, A. B. D., ‘Kuno Fischer. An Estimate of his Life and Work’ (in *Journal of Philosophy, Psychology and Scientific Methods,* Vol. V, p. 57, New York 1908); Falkenheim, H., ‘Kuno Fischer und die Litterar-Historische Methode’ (Berlin 1892); Goehring, H., ‘Von Kuno Fischers Geistesart’ (in *Pädagogisches Magazin,* Heft 317, Langensalza 1907); Petsch, R., ‘Kuno Fischer’ (in *Deutsche Shakespeare Gesellschaft Jahrbuch,* Vol. XLIV, p. 189, Berlin 1908); Trendelenburg, A. F., ‘Kuno Fischer und sein Kant’ (Leipzig 1869); Vaihinger, H., ‘Der Streit zwischen Trendelenburg und Fischer’ (in ‘Commentar zu Kants «Kritik der Reinen Vernunft»’ Vol. II, pp. 290 and 545, Stuttgart 1882–92); Windelbrand, W., ‘Kuno Fischer’ (Heidelberg 1907).

FISCHER, Johann Georg, German poet: b. Gross Süssen, Würtemberg, 25 Oct. 1816; d. Stuttgart, 4 May 1897. From 1833–85 he held various positions as school teacher, most of the time in connection with schools in Stuttgart. Early in life he showed deep interest in nature and many of his poems show this influence. He excelled in popular songs and ballads; and in his love songs nobly idealized nature and passion. He wrote four dramas: ‘Saul’ (1862); ‘Friedrich II von Hohenstaufen’ (1863); ‘Florian Geyer’ (1866); ‘Kaiser Maximilian von Mexico’ (1868). In ‘Aus dem Leben der Vögel’ (1863) he notes the characteristic phenomena of the psychic life of animals with the acuteness of a naturalist and the sympathy of a poet. His other works, practically all of them published in Stuttgart, were ‘Gedichte’ (1838); ‘Dichtungen’ (1841); ‘Gedichte’ (1854); ‘Neue Gedichte’ (1865); ‘Den Deutschen Frauen’ (1869); ‘Aus Frischer Luft’ (1872); ‘Neue Lieder’ (1876); ‘Merlin. Ein Liederzyklus’ (1877); ‘Der Glückliche Knecht. Ein Idyll’ (1881); ‘Auf dem Heimweg’ (1891); ‘Mit Achtzig Jahren’ (1896). Consult Fischer, H., ‘Erinnerungen an J. G. Fischer von seinem Sohne’ (Tübingen 1897).

FISCHER, Joseph, German clergyman and cartographer: b. Quadrath, Rhein, Germany, 19 March 1858. He was educated at the gymnasium, Rhein, Westphalia, and the universities of Münster, Munich, Innsbruck and Vienna, and Jesuit scholasticates in Holland, Austria and England. In 1881 he entered the Society of Jesus and was ordained to the priesthood in

1891. Since 1895 he has been professor of geography and history at Stella Matutina College, Feldkirch. His scientific achievements comprise the discovery of the maps of Waldseemüller of 1507 and 1516 and of Jodocus Hondius in Wolfegg Castle, Württemberg in 1891. In 1903–04, and again in 1909–10, he visited Italy, France and England as member of the Austrian Institute of Historical Studies for the purpose of cartographical research. He has published 'Die Beziehungen Kaiser Rudolfs II zu Erzherzog Matthias bis zum Vertage von Lieben' (1608); 'Der sogennante Schottwiener Vertrag vom Jahre 1600' (1897); 'Der Linzer Tag vom Jahre 1605 in seiner Bedeutung für die Österreichische Haus und Reichsgeschichte' (1898); 'Die Entdeckungen der Normannen in America' (1902; Engl. trans., 1903); 'Die älteste Karte mit dem Namen America A.D. 1507, und die Carta Marina aus dem Jahre 1516 des M. Waldseemüller' (German and English eds., 1903); 'Map of the World by Jodocus Hondius, 1611' (1907); 'Introduction of the Cosmographiæ Introductio of Martin Waldseemüller' (1907); 'Der «deutsche Ptolemäus» um 1490' (1910). He collaborated in *Jahrbuch* des historischen Vereins von Liechtenstein (1910) and contributed to the *Innsbrucker theologische Zeitschrift, Innsbrucker Fernandeums Zeitschrift,* 'Historical Records and Studies,' 'Göttinger Gelehrte Anzeigen,' 'The Catholic Encyclopedia,' and 'Stimmen aus Maria-Laach.'

FISCHER, Ludwig Hans, Austrian painter: b. Salzburg, 2 March 1848. After a course of art study he traveled extensively, settling finally in Vienna. Among his works are nine landscapes for the Museum of Natural History, Vienna, and etchings and engravings forming historical landscapes from Austria-Hungary. He is the author of 'Die Technik der Aquarellmalerei.' Three of his oil paintings, including a 'View of Jerusalem,' are in the Vienna Museum. He also painted many excellent water colors and wrote numerous magazine articles accompanied by clearly defined and spirited drawings.

FISCHER, Paul Henri, French naturalist: b. Paris 1835; d. 1893. He studied science and medicine, securing doctorates in both, and became assistant in paleontology at the Museum of Natural History. He was made assistant naturalist there in 1872. After 1856 he was joint editor of the *Journal de Conchyliologie* and served several terms as president of the Société Géologique de France and the Société Zoologique de France. He published 'Fauna conchyliologique marine de la Gironde et du sud-ouest de la France' (1865; enlarged ed., 1875); 'Recherches sur les Actinies des côtes océaniques de France' (1876); 'Manuel de conchyliologie' (1885); 'Paléontologie de l'ile de Rhodes' (1887).

FISCHER VON ERLACH, Johann Bernhard, Austrian architect: b. Vienna 1650; d. 1723. He spent some time at Rome in preparation for the profession of architect. On his return to his native city he received commissions for several important buildings, including the castle of Schönbrunn, the Hofbibliothek, the palace of Prince Eugène, Church of Saint Charles Boromeo, etc., all in the Baroque style. He also was employed at Prague and Breslau.

FISCUS. See FISCAL.

FISET, fē'zā', **Louis Joseph Cyprien,** Canadian poet: b. Quebec, 3 Oct. 1825; d. 17 Aug. 1898. He received his early education at the hands of private tutors and at the Seminaire de Quebec. In 1848 he was called to the bar and soon after became prothonotary of the Superior Court of the province of Quebec. He wrote the ode of welcome on the occasion of the visit of the Prince of Wales to Quebec in 1860. He was a frequent contributor to French-Canadian periodicals. He was one of the founders of L'Institut Canadien, and served a term as its president. He wrote 'Jude et Grazia, ou les malheurs de l'émigration canadienne' (1861).

FISET, SIR **(Marie), Joseph Eugène,** Canadian soldier: b. Rimouski, 15 March 1874. He was educated at Rimouski College and at Laval University, being graduated with the degree of M.D. in 1896. He joined the volunteer militia service, became major in 1898, and was brevetted lieutenant-colonel in 1901 for his services in South Africa. In 1903 he was made lieutenant-colonel in the army medical service and staff adjutant of medical services. In 1906 he became Deputy Minister of Militia and Defense. He was made commander of the Legion of Honor in 1917 and was knighted the same year.

FISH, Hamilton, American diplomatist: b. New York, 3 Aug. 1808; d. Garrison, N. Y., 7 Sept. 1893. He was the son of Nicholas Fish (q.v.). In 1827 he was graduated at Columbia College, and admitted to the bar in 1830. A Whig in politics, he was elected a congressman in 1842, lieutenant-governor of New York in 1847 and governor in 1848. In 1851 he was returned to the United States Senate, where he opposed the repeal of the Missouri Compromise and joined the Republican party on its formation. During the Civil War he acted as chairman of the Union Defense Committee of New York city and later was appointed by President Lincoln as a member of the commission on the exchange of prisoners. He was Secretary of State under Grant 1869–77, signing, as one of the commissioners, the Washington Treaty of 1871 with Great Britain in the formulation of which he took an important part, and carrying through the settlement of the «Alabama question.» He was also instrumental in settling the so-called «San Juan Boundary Dispute» (q.v.) with Great Britain and in adjusting in 1873 the difficulties between Spain and the United States arising from the «Virginius affair» (q.v.). From 1848–54 he was vice-president, and from 1854–93 president-general of the Society of the Cincinnati. He was also president of the board of trustees of Columbia University from 1859–93. This institution, as well as Union College and Harvard University, conferred honorary degrees on him. Consult Davis, J. C. B., 'Hamilton Fish' (in *Atlantic Monthly,* Vol. LXXIII, p. 215, Boston 1884); Gardiner, A. B., 'Hamilton Fish' (in *New York Genealogical and Biographical Record,* Vol. XXV, p. 1, New York 1894); Hunt, G., 'The Department of State of the United States, etc.' (New Haven 1914); New York State Legislature, 'Proceedings in Memory of the Honorable Hamilton Fish' (Albany 1894); Spring, A., 'Hamilton Fish, Secretary of State' (in *American Law Review,* Vol. XL, p. 801, Saint Louis 1906); United States State Department, ‹Papers Relating to the Foreign Relations of the United States, etc.› (Washington 1869–78).

FISH, Hamilton, Jr., American lawyer and politician: b. Albany, N. Y., 1849. He was graduated at Columbia in 1869; became private secretary to his father, Hamilton Fish; was graduated at the Columbia Law School in 1873 and was appointed aide-de-camp to Governor John Adams Dix of New York. In 1890 he was Republican leader of the assembly and speaker in 1895. In 1903–08 he was assistant treasurer of the United States and in 1909–11 served as member of Congress.

FISH, Nicholas, American military officer: b. New York, 28 Aug. 1758; d. there, 20 June 1833. He joined the Continental Army, participated in the battles at Saratoga in 1777; led a corps of light infantry in the battle of Monmouth; and otherwise distinguished himself during the Revolutionary War. He was brevetted lieutenant-colonel in 1783 and retired in the same year. He was adjutant-general of New York from 1784–93; President Washington appointed him supervisor of United States revenue in 1794. From 1797 to 1805 he served as president of the New York State Society of the Cincinnati. From 1806–17 he was an alderman of the City of New York. He was married to Elizabeth Stuyvesant, a lineal descendant of Peter Stuyvesant; the last Dutch governor of Nieuw Netherlands.

FISH, Nicholas, American diplomatist: b. New York, 19 Feb. 1846; d. there, 16 Sept. 1902. He was educated at Columbia and the Harvard Law School, practised law in New York, became second secretary of legation in Berlin 1871, secretary in 1874, and in 1877–81 was *chargé d'affaires* in Switzerland. From 1882 to 1886 he was United States Minister to Belgium, and in 1887 entered the firm of Harriman & Company, bankers of New York. He was the oldest son of Hamilton Fish (q.v.); successively vice-president and president of the New York chapter of the Society of the Cincinnati, and a member of many clubs.

FISH, Stuyvesant, American banker and railroad official: b. New York, 24 June 1851. In 1871 he became clerk in the New York office of the Illinois Central Railroad, became a director of that road in 1876, second vice-president 1883–84, vice-president 1884–87 and president 1887–1906. He also served as vice-president of the Chicago, Saint Louis and New Orleans Railroad in 1882–84. He was trustee of the Mutual Life Insurance Company of New York from 1883 to 1906, and director of the National Park Bank and other corporations. He published ‹The Nation and the Railways› (1908).

FISH. In the popular sense a fish is a cold-blooded, chordate or vertebrate animal, adapted for life in the water, breathing by means of gill-slits all its life, having its limbs, if present, developed as fins, never as fingers or toes. This definition excludes invertebrates as having no notochord and no backbone. It excludes the tunicates and enteropneustans as not fish-like in form when adult and as being at all stages without fins. It excludes the amphibians, because these develop, in the adult state, jointed limbs with toes and most of them cease to breathe with gills or gill-slits. The fishes, as thus defined, include all members of the groups known as the lancelets (*Leptocardii*), the lampreys (*Cyclostomi*), the sharks (*Elasmobranchii*), and the true fishes (*Teleostomi*), as also all of the varied series of extinct fish-like forms. In technical writings the lancelets and the lampreys are usually excluded from the class *Pisces* or fishes and many writers would still further limit the name of *Pisces* by the exclusion of sharks and skates and also the chimæras (*Holocephali*). Still others exclude the *Dipneusta* and the extinct *Placodermi* or *Ostracophori* and *Arthrodira*. It is perhaps not necessary to regard *Pisces* or fishes as a technical term at all. In this case there is no violence in using the word fish as coextensive with the popular definition as given above. Taking this significance, we may recognize two classes of chordates (*Tunicata* and *Enteropneusta*) as lying below and to one side of the series of fishes, while this series is itself composed of nine classes or sub-classes unequal in size and in taxonomic value, *Leptocardii, Cyclostomi, Ostracophori, Cycliæ, Elasmobranchii, Arthrodira, Crossopterygii, Dipneusta,* (*Dipnoi*) or (*Plagiostomia*) and *Actinopteri*. The first three groups differ widely from the others and must in any scheme of classification be regarded as forming distinct classes. The last-named class or sub-class includes the great majority of recent fishes. The *Cycliæ, Ostracophori* and *Arthrodira* are wholly extinct; the *Crossopterygii* and *Dipneusta* nearly so.

Taking the true fishes, or *Actinopteri*, as typical of the group, we see at once that these have the general structure of the higher vertebrates, but with less complexity of structure, with various adaptations that fit these animals for life in the water.

Form of the Body.— The body is in general boat-shaped, the head in the same axis, without neck in most cases, the shoulder-girdle being attached to the skull at the nape and in the more specified forms of the pelvic girdle joined to the shoulder-girdle below. The form is fitted for swift progress through the water. The body is longer than deep and the greatest width is in front of the middle, leaving in most cases the compressed paddle-like tail to serve as the organ of locomotion. To all of these statements there are numerous exceptions. Most fishes depend on speed to secure their food or to escape from their enemies, but there are some which preserve themselves by lying prone on the bottom, by hiding in crevices of one sort or another, or which are defended from all attacks by pungent, sometimes envenomed, spines or by a bony coat of mail.

Exoskeleton of the Fish.— The surface of the fish is typically covered by an exoskeleton of overlapping scales. To this there are many exceptions. Some are naked, some covered with prickles, spines or bony plates. The scales may be ganoid (enameled, like teeth), placoid (reduced to shagreen-like roughness), ctenoid (with a comb-edge), or cycloid (smooth, with concentric striæ), or they may be variously coalescent, forming bony plates. Historically the placoid scale precedes the ganoid scale. This is followed by the cycloid, and finally by the ctenoid type. Bony plates may be formed by the coalescence of scales of any type.

Fins of the Fish.— In most cases the motion of a fish is mainly produced by the lateral movement of a caudal or tail fin, the other fins exerting chiefly the function of direction. In the more primitive of existing fishes the different fins are composed of soft rays connected by membrane. The soft rays are finely jointed and usually branched, as distinguished from the spines, which are without branches or joint and which are usually stiff and pungent. In the more specialized fishes spines are usually present, these occupying the front of the dorsal and anal fins, the first ray of the ventral fin being also spinous.

The fins usually present are of two kinds — the paired fins and the vertical fins. The paired fins are represented on either side of the body, the anterior or uppermost pair, the pectoral fins, representing in the fish the arms or forelegs of the higher vertebrates, the lower or posterior pair (ventral or pelvic fins) representing the hinder legs. The verticle fins are on the median line of the body, the dorsal on the back, the caudal on the tail and the anal on the lower side behind the body cavity. Each of these fins is subject to great variation.

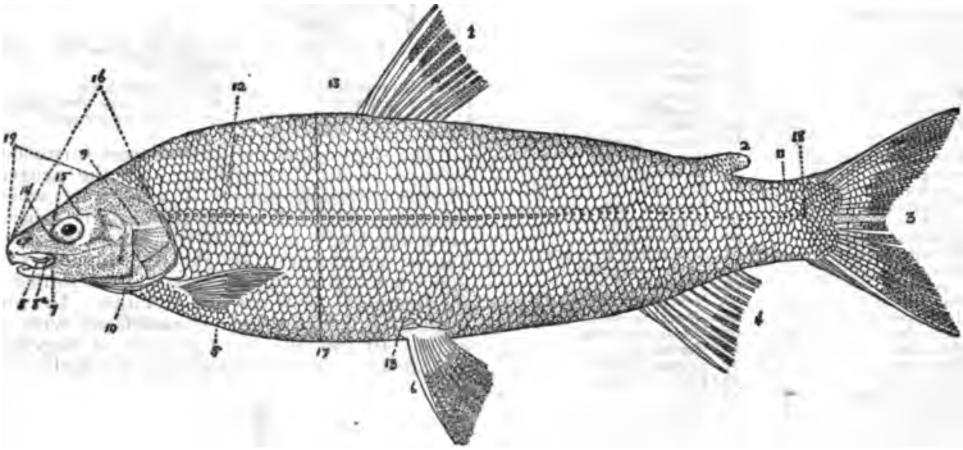
The vertical fins, with their appendages, arise from the modification and specialization of a dorsal median fold of skin. This is found in embryos and in the lancelet and other forms of low organization. It is generally taught that the paired fins, with the bones which support them, have been derived from a lateral fold of skin, similarly modified, and still more specialized. As to this, the evidence is much less complete than in the case of the vertical fins. But there is some evidence which would show that the paired fins arose from modification of gill structures.

At the base of each ray or group of rays in the vertical fins, supporting bones are developed. These bones, called interspinal bones (interneural along the back, interhæmal below), stand in some definite relation to the bones of the vertebral column, to which, however, they are not directly joined.

The pectoral fin is attached, by means of certain intermediate bones, to the shoulder-girdle. The ventral fin is similarly joined to a pelvis. The pelvis in all the lower fishes is detached from the rest of the skeleton and placed beneath the body cavity. In the more specialized modern forms the pelvis is moved forward, usually connected with the shoulder-girdle, but sometimes attached at the throat well in front of the latter. In accordance with the insertion of the pelvis, the ventral fins are said to be *abdominal* (free from the shoulder-girdle, as in the whitefish), *thoracic* (connected with the shoulder-girdle), or *jugular* (in front of the shoulder-girdle).

Muscular System of the Fish.— The movement of the fins is accomplished through the agency of muscles. These organs lie band-like along the sides of the body forming the flesh of the fish. They are little specialized and not as clearly differentiated as in the higher vertebrates. In the typical fishes there are several distinct systems of muscles, controlling the jaws, the gills, the eyes and the different fins. The largest of these is the great lateral muscle, composed of flake-like segments, these corresponding in general in number to the number of vertebræ. In general the muscles are white in color and tender in substance. In a few fishes muscular tissues are modified into electric organs.

The skeleton of the fish is cartilaginous in the more primitive forms, bony in the more specialized types. In all cases the bones contain less of mineral matter than do the bones of the higher vertebrates.



GREAT LAKE WHITEFISH (*Coregonus clupeiformis*).

Showing the location of fins and mouth parts (after Jordan and Evermann).

1. Dorsal fin.
2. Adipose dorsal.
3. Caudal fin.
4. Anal fin.
5. Pectoral fin.
6. Ventral fin.
7. Lower jaw or mandible.
8. Upper jaw or maxillary.
8a. Supplementary maxillary.
9. Opercle.
10. Branchiostegals.
11. Caudal peduncle.
12. Lateral line.
13. Series of crosswise scales usually counted.
14. Snout.
15. Eye.
16. Head.
17. Depth of body (measured in number of times to base of caudal).
18. Base of caudal.
19. Distance from snout to nape or occiput.

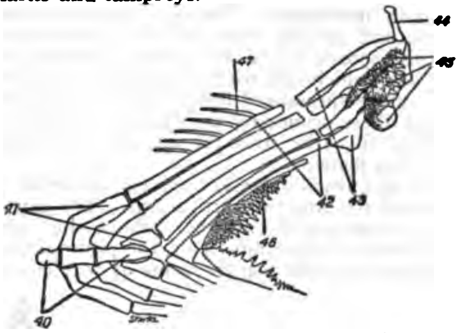
Skeleton of the Fish.— In the process of development the vertebral column is built up about a soft cartilaginous cord extending lengthwise of the body, called the notochord. This exists in all young fishes and is more or less completely persistent through life in the more primitive types, as the lamprey or the sturgeon. This notochord is not the backbone, but it indicates where the backbone is to be. In the higher forms the vertebræ are developed around it, strung spool-fashion, as it were, until finally in most recent fishes the original chord is entirely obliterated.

Explanation of plate of the skeleton of the striped bass (*Roccus lineatus*) after Edwin Chapin Starks.

1. Vomer.
2. Ethmoid.
3. Prefrontal.
4. Frontal.
5. Sphenotic.
6. Parietal.
7. Epiotic.
8. Supraoccipital.
9. Pterotic.
10. Opisthotic.
11. Exoccipital.
12. Basioccipital.
13. Parasphenoid.
14. Basisphenoid.
15. Prootic.
16. Alisphenoid.
17. Hyomandibular.
18. Symplectic.
19. Quadrate.
20. Pterygoid.
21. Palatine.
22. Mesopterygoid.
23. Metapterygoid.
24. Preopercle.
25. Opercle.
26. Subopercle.
27. Interopercle.
28. Articular.
29. Angular.
30. Dentary.
31. Maxillary.
32. Premaxillary.
33. Interhyal.
34. Epihyal.
35. Cerathoyal.
36. Basihyal.
37. Glossohyal.
38. Urohyal.
39. Branchiostegal.
40. Basibranchials.
41. Hypobranchials.
42. Ceratobranchials.
43. Epibranchials.
44. Suspensory pharyngeal.
45. Upper or Superior pharyngeals.
46. Lower or Inferior pharyngeals.
47. Gill-rakers.
48. Supraorbital.
49. Preorbital.
50. Suborbitals.
51. Nasal.
52. Supra-temporal.
53. Post-temporal.
54. Supraclavicle.
55. Clavicle.
56. Postclavicle.
57. Hypercoracoid.
58. Hypocoracoid.
59. Mesocoracoid.
60. Actnosts.
61. Pectoral rays.
62. Pelvic girdle.
63. Ventral spine.
64. Abdominal vertebræ.
65. Caudal vertebræ.
66. Centrum.
67. Neuropophyses.
68. Neural spine.
69. Hæmapophyses.
70. Hæmal spine.
71. Zygapophyses.
72. Parapophyses.
73. Rib.
74. Epipleural spines or Epipleurals.
75. Interneural spines or Interneurals.
76. Dorsal rays and spines.
77. Interhæmal spines or Interhæmals.
78. Anal rays and spines.
79. Hypural.
80. Caudal rays.

The skull of the fish consists of a great variety of bones, the names of which are given on the accompanying plate. In the naming of the bones of the head and shoulder-girdle of fishes great confusion has arisen. This is due mainly to ineffective attempts to trace the homologies of these bones with bones occupying similar positions in the skeleton of man; while, no doubt, the skeleton of the higher vertebrates is derived by descent from that of primitive fishes, homologies can be traced only in a general way. The skull of the one corresponds to the skull of the other, but the specialized fishes have developed many more bones than were found in ancestral types and many more than exist in man. In like fashion the shoulder-girdle in the one represents that of the other, but the fish has more bones than can be covered by the names scapula, coracoid and clavicle.

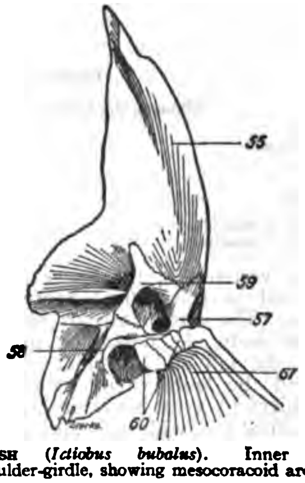
In the accompanying plate of the bones of the striped bass (after Edwin Chapin Starks) we use the terminology now adopted by Gill, Starks and most American osteologists. The bones of the head may be roughly divided into those of the cranium, the jaws, the suspensory (of the lower jaw), the gill-structures and the membrane-bones. The latter, on the outside of the head, are formed by ossification of the skin and have no homologies among the higher vertebrates. They are also wanting in the sharks and lampreys.



STRIPED BASS (*Roccus lineatus*). Branchial arches (after Starks).

40. Basibranchials.
41. Hypobranchials.
42. Ceratobranchials.
43. Epibranchials.
44. Suspensory pharyngeal.
45. Upper pharyngeal.

The shoulder-girdle in the lower forms consists of an arch of cartilage. In the progress of specialization this is divided into several pieces as indicated in the plate. It is separate from the skulls in sharks and skates, as in the higher vertebrates. In the typical fishes its uppermost bone (post-temporal) is joined to the temporal bone of the cranium. In some groups it is immovably consolidated with the latter. In the eels, by a process of degeneration, it loses its connection with the skull. The pelvis in fishes usually consists of a single bone on either side, more or less fully coalesced with its fellow.

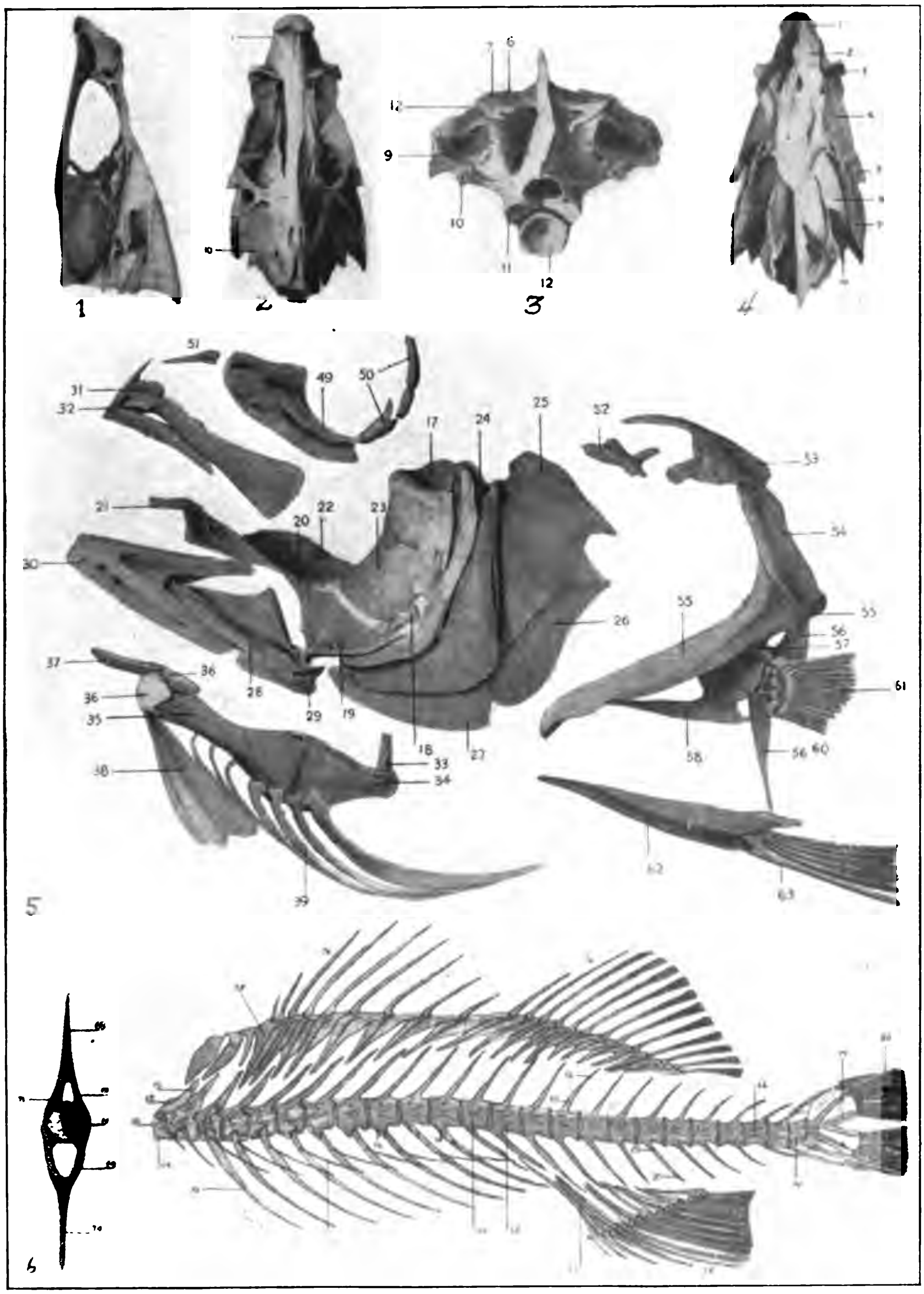


BUFFALO-FISH (*Ictiobus bubalus*). Inner view of shoulder-girdle, showing mesocoracoid arch.

55. Clavicle.
57. Hypercoracoid.
58. Hypocoracoid.
59. Mesocoracoid.
60. Actinosts.
61. Pectoral rays.

The vertebral column may be divided into abdominal and caudal vertebræ. The former have their lower processes divergent, to include the body cavity. In the caudal vertebræ, the hæmal processes unite, leaving opening only

ANATOMY OF FISH



SKELETON OF STRIPED BASS

1, 2, 3, 4 Skull **5 Face-bones, shoulder-girdle and hyoid arch** **6 Vertebral column and fins**

(For explanation of small figures, see text)

for the hæmal canal or place of the large artery. The neural processes of each vertebra unite above the centrum or body of the vertebræ, leaving space for the spinal cord. The pointed upper continuation of each is called the neural spine as the downward projection is called the hæmal spine. In the primitive fishes generally the tail is extended to a point, the last vertebræ being progressively reduced and the caudal fin lying below the axis. This forms the heterocercal tail, characteristic of the shark, sturgeon and of various extinct types of fish. In the modern types, the vertebræ cease more or less abruptly at the base of the caudal fin, the tail being homocercal.

The number of vertebræ is least in the more specialized, spiny-rayed fishes. In several families of these there are 24 vertebræ, 10 abdominal and 14 caudal. This number is much greater in all the soft-rayed and all the primitive forms. It is also materially increased by a process of degeneration in most arctic or subarctic derivatives from these families and in general in fresh-water, pelagic and deep-sea forms derived from forms having 24 vertebræ. In cold waters, fresh waters and the oceanic abysses, the processes of competition called natural selection are apparently less active and we have the phenomenon of reduction of parts with the increase in number of similar structures. This statement must be regarded as hypothetical. While it is a rule almost universal, that in each group cold water forms have the vertebræ smaller and more numerous, we have yet to find an adequate explanation of the cause of the phenomenon.

The cause for the vegetative increase in the numbers of vertebræ as we leave the tropical shores may perhaps be found in the reduction of the stress of natural selection. For such «cessation of selection» the name *panmixia* has been suggested by Dr. August Weismann. It should be noticed that the increase in the number of vertebræ is accompanied, necessarily, by the loss of importance and the reduction of specialization in each individual one. In this change the fin-rays usually share, there being a greater number, as a rule, in forms outside the tropics as compared with similar forms on warm shores.

Organs of Nutrition.— The organs of nutrition in the fish are generally homologous with those of higher vertebrates. Some fish feed exclusively on vegetable food. These have generally incisor-like teeth loosely planted in the gums and a greatly elongate alimentary canal.

Most fishes feed on animal food, other fishes, crustaceans, mollusks, worms, insects and whatever else may be found in the sea. The mouth and teeth are adapted to the kind of food and the varieties in form and armature are even more varied than the forms of the body among fishes.

The mouth is usually capacious. It may have no teeth; it may have teeth on the jaws only, or any bone in its circumference may be armed with them. In most fishes additional teeth of one sort or another may be found on the pharyngeals, in the gullet behind the gills.

The stomach may be U-shaped — an opening at either end — or it may have the form of a blind sac, the two openings close together. Often glands, called pyloric cæca, secreting a digestive fluid, occur at the end of the stomach. The intestine may be a single tube, or it may be variously complicated, wound in spiral, or as in the shark, having its surface increased by means of a spiral valve within. The liver gall-bladder and spleen are usually developed in fishes much as in the higher forms.

Fishes lack salivary glands. The tongue is cartilaginous or bony, with few nerves of taste, although taste buds may exist in the barbels, as in the cat-fish. Kidneys lie along the inner edge of the backbone, less specialized than in the higher vertebrates, their ducts leading into a common cloaca. In the lower fish-like forms (lancelets) the structures which serve the purpose of kidneys bear a close resemblance to similar glands (nephridia) in worms.

Organs of Respiration and Circulation.— In the lowest fish-like forms (lancelets), the heart is reduced to a simple pulsating tube. In the typical fishes it consists mainly of three parts, the auricle, the ventricle and a thickened part of the large artery, known as the *bulbus arteriosus*. These parts correspond in a general way to right auricle and right ventricle in the higher vertebrates. The blood reaches the heart from the vein-system of the body. It is passed from auricle to ventricle, then sent through a large artery to the gills to be purified. From the gills it is distributed through the main artery or aorta to the different parts of the body, to be again gathered up from the capillaries into the veins.

It is not returned to the heart after purification, as in the higher vertebrates. Its flow is therefore relatively sluggish, and, as in reptiles and amphibians, its temperature is little above that of the environment. In some of the more primitive fishes the heart is more complex than in the typical forms, the arterial bulb being provided with a large number of valves.

All the chordate animals, including the tunicates and the *Enteropneusta*, have the purification of the blood effected through some form of gill-slit. In the lower forms these are merely slits, admitting water to the pharynx, where it comes in contact with thin membranes covering capillaries filled with blood.

In the typical fishes a much more elaborate apparatus is developed. There are usually five long bony arches attached to the cranium above and to the base of the tongue below. Each of these has two rows of slender filaments, the gills. The blood flows in and out of these filaments, where it comes in contact with the water. This water is swallowed through the mouth, and is forced out through the gill-opening. Behind the true gill-arches is a fifth arch, more or less similar usually without gills, being modified to form a pair of gullet-jaws, the pharyngeals. On the anterior edge of the first gill-arch is a series of projections, sometimes forming a straining apparatus. These are the pharyngeals. A small accessory gill, the pseudobranchia, is usually developed on the inner sideof the opercle or gill-cover.

In sharks and skates, the gills are fastened by their longer side, like the leaves of a book. In other groups there are many minor modifications.

In the sharks and skates there is no trace of lung or air-bladder. In the more primitive forms ancestral to the true fishes, there is a well-developed lung, which assists in the purification of the blood in exactly the same way as the lung of the higher vertebrates. Most of the forms known or supposed to possess lungs (*Dipneusta, Crossopterygii, Ganoideii*) are now extinct. In the few living forms with this character (*Neoceratodus, Lepidosiren, Protopterus, Polypterus, Lepisosteus* and *Amia*) this lung is either of one or two lobes. It is connected by a trachea with the pharynx. In the earliest forms this windpipe opens below the œsophagus, as in the higher vertebrates, but in the other forms, the opening is transferred to the dorsal side. These early fishes were therefore literally amphibious, being capable both of breathing atmospheric air with the lungs and the air dissolved in water, with the gills. There is little doubt that from some of these forms, probably crossopterygians, the whole series of land vertebrates is descended, while from the same stock has arisen the great body of the typical or bony fishes. In the former case we have the gradual obliteration of the gills, which are developed only in embryonic or larval stages. Among the typical fishes we have the gradual degeneration of the lung and the loss of its function as a breathing-organ.

In this case we have first the reduction of the lung to a single sac, the loss of its cellular structure. It assumes in the soft-rayed fishes the form of an empty sac, sometimes divided by a cross-constriction, the anterior part connected with the œsophagus by a very slender membranous tube. This tube is gradually lost in the spiny-rayed fishes, no trace of it usually existing except in the embryo. The air-bladder is then a hollow sac filled with air containing an excess of nitrogen, this air being secreted from the blood of the fish. The air-bladder has some value in enabling the fish to hold itself in place in the water. In pelagic fishes, and in fishes which habitually lie on the bottom, the air-bladder is often greatly reduced, or entirely obliterated, when the fish is fully developed. The different stages of the air-bladder must be looked on as steps toward the gradual loss of the lung, an organ which becomes progressively less important in the more complete adjustment of the fish to continuous life in the water.

The Organs of Sense.— The sense-organs of the fish correspond in general to those of the higher vertebrates. The sense of taste is, however, feeble, and that of hearing is muffled and without much power of acute discrimination. The sense of smell resides in the nostrils, which have no relation to the work of breathing. No fish breathes through its nostrils, and only in a few of the more generalized types does the nostril pierce through the roof of the mouth. In the bony fishes the nostrils are cavities, one on either side, lined with delicate or fringed membrane, well provided with blood-vessels, as with nerves from the olfactory lobe. In most cases each nasal cavity has two external openings, either simple or with the rim of the nostril forming a papilla or barbel. The openings may be round, slit-like, pore-like, or may have various other forms. In certain families of bony fishes there is but one opening to each nostril. In the sharks, rays, and chimæras there is also but one opening on either side and the nostril is larger and highly specialized, with valvular flaps controlled by muscles which enable them "to scent actively as well as to smell passively."

In the lancelet there is a single median nostril, a small depression at the front of the body covered by ciliated membrane. In the hagfish the single median nostril pierces the roof of the mouth and is strengthened by cartilaginous rings, like those of the windpipe. In the lamprey the single median nostril leads to a blind sac. In all other fishes there is a nasal sac on either side of the head. There is no doubt that the sense of smell in fishes is relatively acute, and that the odor of their prey attracts them to it. It is known that flesh, blood, or a decaying carcass will attract sharks and other predatory fish are drawn in a similar manner. At the same time, the strength of this function is yet to be tested by experiments.

The Organs of Sight.— The eyes of fishes differ from those of the higher vertebrates mainly in the spherical form of the crystalline lens. This extreme convexity is necessary because the lens itself is not very much denser than the fluid in which the fishes live. The eyes vary much in size and somewhat in form and position. They are larger in fishes living at a moderate depth than in shore-fishes or river fishes. At great depths, as a mile or more, where all light is lost, they become aborted or rudimentary, and may be covered by the skin. Often species with very large eyes, making the most of a little light, or of light from their own luminous spots, will inhabit the same depths with fishes having very small eyes, or eyes useless for seeing, these being retained as vestigial structures through heredity. Fishes which live in caves become also blind, the structures showing every possible phase of degradation. The details of this gradual loss of eyes, either through reversed selection or hypothetically through inheritance of atrophy produced by disuse, have been given in a number of memoirs on the blind fishes of the caves of Kentucky, Missouri and Cuba by Dr. Carl H. Eigenmann.

Many of the sharks possess a distinct nictitating membrane or special eyelid, moved by a set of muscles. The iris in most fishes surrounds a round pupil, without much power of contraction. It is frequently brightly colored, red, orange, black, blue or green.

In the lowest of the fish-like forms, the lancelet, the eye is simply a minute speck coated by black pigment, connected with the spinal cord by a short nerve. In the development of such a pigment-spot the vertebrate eye doubtless has its origin. In the hagfishes, which stand next highest in the series, the eye, still incomplete, is very small and hidden by the skin and muscles. This condition is very different from that of the blind fishes of the higher groups in which the eye is lost through atrophy, because in life in caves, or under rocks, the organ is no longer necessary.

The Ear of the Fish.— The ear of the typical fish consists of the labyrinth only, including the vestibule and three semi-circular canals, these dilating into one or more sacs which contain large, loose bones, the ear-stones or otoliths. There is no external ear, no tympanum and no Eustachian tube. The ear-sac on each side is lodged in the skull or at the base of the cranial cavity. It is commonly surrounded by bone, but sometimes it lies near a fontanel or opening in the skull above.

The otoliths, two in each labyrinth, are usually large firm bone with enameled surface and peculiar grooves and markings. Each species has its peculiar type, but they vary much in different groups of fishes. The sense of hearing in fishes cannot be very acute and is probably confined chiefly to the perception of disturbances in the water. Most movements of the fish are governed by sight rather than by sound.

Voices of Fishes.— Some fishes make distinct noises, variously described as quivering, grunting, grating or singing. The name grunt is applied to species of *Hæmulon* and related genera and fairly describes the sound these fishes make. The Spanish name *ronco* or *roncador* (grunter or snorer) is applied to several fishes, both sciænoid and hæmuloid. The noise made by these fishes may be produced by forcing air from part to part of the complex air-bladder, or it may be due to grating one on another of the large pharyngeals. The grating sounds arise, no doubt, from the pharyngeals, while the quivering or singing sounds arise in the air-bladder: The midshipman, *Porichthys notatus*, is often called singing-fish, from a peculiar sound it emits. These sounds may possibly be useful to the species, but they are not well differentiated, nor have they been so investigated as to be well understood.

Sense of Taste.— It is probably certain that fishes possess a sense of taste, though it is little differentiated and is in some species located in the barbels about the mouth. The tongue is without delicate membranes or power of motion. In some fishes certain parts of the palate or pharyngeal region are well supplied with nerves, but no direct evidence exists that these have a function of discrimination among foods. Fishes swallow their food very rapidly, often whole; and mastication, when it takes place, is a crushing or cutting process, not one likely to be affected by the taste of the food.

Sense of Touch.— The sense of touch is better developed among fishes. Most of them flee from contact with actively moving objects. Many fishes use sensitive structures as a means of exploring the bottom, or of feeling their way to their food. The barbel or fleshy filament, wherever developed, is an organ of touch. In some fishes, as the moray, barbels are outgrowths from the nostrils. In the catfish the principal barbel grows from the rudimentary maxillary bone. In the horned dace and gudgeon the little barbel is attached to the maxillary. In other fishes barbels grow from the skin of the chin or snout. In the goat-fish and surmullet the two chin-barbels are highly specialized. In the cod-fish the single beard is little developed. In the gurnards and related forms, the lower rays of the pectoral are separate and barbel-like. Detached rays of this sort are found in the thread-fins and in various other fishes. Barbels or fleshy flaps are often developed over the eyes and sometimes on the scales of the fins.

The sense of pain is very feeble among fishes. A trout has been known to bite at its own eye, placed on a hook and similar insensibility has been noted in the pike and other fishes. «The Greenland shark, when feeding on the carcass of a whale, allows itself to be repeatedly stabbed in the head without abandoning its prey.»

The Nervous System.— The nervous system in the fish, as in the higher vertebrates, consists of brain and spinal cord, with sensory or afferent and motor or efferent nerves. As in other vertebrates, the nerve-substance is divided into gray matter and white matter, or nerve-cells and nerve-fibres. In the fish, however, the whole nervous system is relatively small, its structures feeble and the gray matter less developed than in the higher forms. According to Günther the brain in the pike (*Esox*) forms but 1–1305th part of the weight of the body; in the burbot (*Lota*) about 1–720th part.

The cranium in fishes is relatively small, but the brain does not nearly fill its cavity, the space between the dura mater, which lines the skull cavity and the arachnoid membrane, which envelops the brain, being filled with a soft fluid containing a quantity of fat.

It is most convenient to examine the fish-brain in its higher stages of development, as seen in the sun-fish, striped bass or perch. As seen from above, the brain of a typical fish seems to consist of five lobes or ganglia, four of them in pairs, the fifth posterior to those on the median line. The posterior lobe is the cerebellum or metencephalon and it rests on the broadened termination of the spinal cord, called the medulla oblongata.

In front of the cerebellum lies the largest pair of lobes, each of them hollow, the optic nerves being attached to the lower surface. These are known as the optic lobes or mesencephalon. In front of these lie the two lobes of the cerebrum, also called the hemispheres, the prosencephalon. These lobes are usually smaller than the optic lobes and solid. In some fishes they are covered by a fold, but are never corrugated, as is the brain of the higher animals. In front of the cerebrum lie the two small olfactory lobes, which receive the large olfactory nerves from the nostrils.

In the hollow of the optic lobe are small protuberances, supposed to represent the corpora quadrigemina of the higher vertebrates. From the lower surface of the brain is suspended the hypophysis or pituitary gland.

In most of the bony fishes the structure of the brain does not differ materially from that seen in the perch. In the sturgeon, however, the parts are more widely separated, so that the connecting nerve-substance is more clearly seen between the several parts. In the dipnoans the cerebral hemispheres are united, while the optic lobe and cerebellum are very small. In the sharks and rays the large cerebral hemispheres are usually coalescent into one, and the olfactory nerves dilate into large ganglia below the nostrils. The optic lobes are smaller than the hemispheres and also coalescent. The cerebellum is very large, and the surface of the medulla oblongata is more or less modified or specialized.

Besides the structures noted in other fishes, the epiphysis or pineal organ is largely developed in sharks and traces of it are found in most or all of the higher vertebrates. In some of the lizards this epiphysis is largely developed, bearing at its tip a rudimentary eye. This leaves no doubt that in these forms it has an optic function. For this reason the structure, wherever found, has been regarded as a rudimentary eye, and the "pineal eye" has been called the "unpaired median eye of chordate" animals.

It has been supposed that this eye, once possessed by all vertebrate forms, has been gradually lost with the better development of the paired eyes, being best preserved in reptiles as "an outcome of the life-habit which concealed the animal in sand or mud and allowed the forehead surface alone to protrude, the medium eye thus preserving its ancestral value in enabling the animal to look directly upward and backward." This we may doubt, as in none of the fishes is the epiphysis more than a nervous enlargement and neither in fishes nor in amphibia is there the slightest suggestion of its connection with vision. It seems probable, as suggested by Dr. Hertwig, that the original function of the pineal body was a nervous one, and that its connection with, or development into, a median eye in lizards was a modification of a secondary character.

The brain of the cyclostomes (hagfishes and lampreys) differs widely from that of the higher fishes and the homologies of the different parts are still uncertain. The different ganglia are all solid and are placed in pairs. It is thought that the cerebellum is wanting in these fishes, or represented by a narrow commissure (*corpus restiforme*) across the front of the medulla. In the lancelet there is no trace of brain, the band-like spinal cord tapering toward either end.

The spinal cord extends from the brain to the tail, passing through the neural arches of the different vertebræ when these are developed. In the higher fishes it is cylindrical and inelastic. In a few fishes (head-fish, trunk-fish) in which the posterior part of the body is shortened or degenerate, the spinal cord is much shortened, and replaced behind by a structure called cauda equina. In the head-fish it has shrunk into "a short and conical appendage to the brain." In the cyclostomes and chimæras the spinal cord is elastic, and more or less flattened or band-like, at least posteriorly.

The nerves of the fish correspond in place and function with those of the higher animals. They are, however, fewer in number, both large nerve-trunks and smaller nerves being less developed than in higher forms. The olfactory nerves and optic nerves may be regarded as outgrowths of the brain. The olfactory nerves, or first pair, extend through the ethmoid bone to the nasal cavity, which is typically a blind sac, with two roundish openings, but is subject to many variations. The optic nerves, or second pair, extend from the eye to the base of the optic lobes. In cyclostomes these nerves run from each eye to the lobe of its own side. In the bony fishes or *Teleostei* each runs from the eye to the lobe of the opposite side. In the sharks, rays, chimæras and ganoids the two optic nerves are joined in a chiasma as in the higher vertebrates. The other nerves arising in the brain need not be mentioned in detail.

A sympathetic system corresponding to that found in the higher vertebrates is found in all the *Teleostei* or bony fishes, and in the body of sharks and rays when it is not extended to the head.

The operations of the nervous system in fishes are essentially those of the higher vertebrates, the instincts being relatively weak and the intellect or power of choice among competing responses to external stimulus being apparently wanting. All acts of the fish may be regarded as reflex, the results of external stimulus or of stimulus arising within the body of the fish. These actions in each species tend to run in grooves or to be repeated in a special way for each species. These ways constitute the habits of the fish.

Organs of Reproduction.— In most fishes the germ-cells are produced in large sacs (ovaries, testes) arranged symmetrically one on either side of the posterior part of the abdominal cavity. The sexes are generally but not always similar externally, and may be distinguished on dissection by the difference between the sperm-cells and the ova. The ovary with its eggs is more yellow in color and the contained cells appear granular. The testes are whitish or pinkish, their secretion milk-like and, to the naked eye, not granular.

In a very few cases both organs have been found in the same fish as in *Serranus*, the sea-perch of Europe, but all fishes seem to be normally diœcious, the two sexes in different individuals. There are no external genital organs, but in some species a papilla or tube is developed at the end of the uro-genital sinus. This may exist in the breeding season only, as in fresh-water lampreys, or it may persist through life, as in some gobies.

The great majority of fishes are oviparous, the egg-cells being fertilized after deposition. The eggs are laid in gravel or sand or other places suitable for the species, and the milt or sperm-cells of the male is discharged over or among them in the water. A very small quantity of the sperm-fluid may impregnate a large number of eggs. In a number of families the species are ovoviviparous, the eggs being hatched in the ovary or in a dilated part of the oviduct. In no case is a real uterus developed. In the case of viviparous fishes actual copulation takes place, and there is usually a modification of some organ to effect transfer of the sperm-cells. This may be the sword-shaped form of the anal fin in many top-minnows, the fin itself being placed in advance of its usual position. It may be an alteration of the structure of part of the anal fin as in the surf-fishes (*Embiotocidæ*); or, as in the *Elasmobranchi*, large bony organs (claspers) may be developed from the ventral fins.

In some viviparous fishes, as the rock-fishes and rose-fishes (*Scorpænidæ*), the young fishes are very minute at birth. In others, as the surf-fishes, they are relatively large and few in number. In the viviparous sharks, which constitute the majority of the species, the young are large at birth and prepared to take care of themselves.

The eggs of fishes vary much in size and form. In those sharks and rays which lay eggs the ova are deposited in a horny egg-case, in color and texture suggesting the kelp in which they are laid. The eggs of the bull-headsharks (*Heterodontus*) are spirally twisted, those of the cat-sharks (*Scylliorhinidæ*) quadrate, with long filaments at the angles. Those of rays are wheelbarrow-shaped, with four handles. One egg-case may sometimes contain several eggs, and develop several young. The eggs of lancelets are small, but those of hagfishes and lampreys are large, ovate, with fibres at each end, each with a triple hook at tip. The chimæras have also large egg-cases, oblong in form.

In the higher fishes the eggs are spherical, large or small according to the species, and varying in the firmness of their outer walls. All contain food-yolk from which the embryo in its earlier stages is fed. The eggs of the eel (*Anguilla*) are microscopic. According to Günther, 25,000 eggs have been counted in the herring, 155,000 in the lumpfish, 3,500,000 in the halibut, 7,635,200 in the sturgeon and 9,344,000 in the cod. Smaller numbers are found in species with large ova. Where an oviduct is present, the eggs are often poured out in glutinous masses, as in the bass. When, as in the salmon, there is no oviduct, the eggs lie separate and do not cohere together. It is only with the latter class of fishes, those in which the eggs remain distinct, that artificial impregnation and hatching are practicable. In this regard, the adaptability of the salmon and trout is pre-eminent. In some fishes the ovary of but one side is developed.

In most fishes the parents take no care of their eggs or young. In a catfish (*Bunocephalus*) the eggs adhere to the under surface of the females. In a kind of pipefish (*Solenostomus*) a large pouch for retention of the eggs is formed on the belly of the female. In the sea-horses and pipefishes a pouch is formed in the skin, usually underneath the tail of the males. Into this the eggs are thrust, and here the young fishes hatch out, remaining until large enough to take care of themselves.

In certain sea catfishes the male carries the eggs in his mouth, thus protecting them from the attacks of the female. In numerous cases the male constructs a rough nest, which he defends against all intruders, against the female as well as against outside enemies. The nest-building habit is especially developed in the sticklebacks (*Gasterosteidæ*), a group in which the male fish, though a pigmy in size, is very fierce in disposition. In a minnow of Europe (*Rhodeus amarus*) the female is said to deposit her eggs within the shells of river mussels.

In the relatively few cases in which the sexes are unlike, the male is usually the brighter in color and with more highly developed fins. Blue, red, black and silvery white pigment are especially characteristic of the male, the olivaceous and mottled coloration of the female. Sometimes the male has a larger mouth, or better developed crests, barbels or other appendages. In some species the pattern of coloration in the two sexes is essentially different.

In various species the male develops peculiar structures not found in the female, and often without any visible purpose. In the chimæra, a peculiar cartilaginous hook, armed with teeth at the tip, is developed in the male only. In the skates or true rays (*Raja*) the pectoral fin has near its edge two rows of stout incurved spines. These the female lacks.

In the breeding season the male sometimes becomes much brighter by the accumulation of bright red or blue pigment or of black or white pigment-cells. This is especially true in the minnows, darters, and other fresh-water species which spawn in the brooks of northern regions in the spring. In the minnows and suckers horny excrescences are also developed on head, body or fins, to be lost after the deposition of the spawn.

In the salmon, especially those of the Pacific, the adult male becomes greatly distorted in the spawning season, the jaws and teeth being greatly elongated, and hooked or twisted so that the fish cannot shut its mouth. After the act of spawning, all the individuals of these species die, both male and female. The Atlantic salmon and the trout show also some elongation of the jaws, but not to the same extent, and in these species the individuals mostly survive the act of spawning.

In fishes generally the eggs are laid in the spring, to be hatched in warming water. Among the salmon, trout and cod-fishes, a reverse condition obtains. The eggs are laid in fall or winter, being deposited in water which is growing colder, hatching when the temperature of 54° F. is passed. In those fishes which pair, the relation seems not to be permanent, nor is anything to be called affection recorded among them.

Embryology and Growth of Fishes.— The egg of the fish develops only after fertilization, the union of its nuclear substance with that of a sperm-cell from the male. When this process, known as amphimixis, takes place, the egg is ready to begin its segmentation. The eggs of all fishes contain more or less of food-yolk attached to the structures of the germ-cell proper and included with it in the same spherical mass. The presence of this food-yolk affects the manner of segmentation.

The process of cell-division or segmentation common among fishes need not be described in detail, as it is essentially that of the higher vertebrates. When the food-substance or yolk is consumed, and the little fish is able to shift for itself, it leaves the egg-envelopes and is said to be hatched.

The young fish usually differs from the adult chiefly in size and proportions. The eye is larger, the head larger, the fins are lower, the appendages less developed, and the body more slender in the young than in the adult. But to most of these distinctions there are numerous exceptions, and in some fishes there is a change so marked as to be fairly called a metamorphosis. In such case the young fish in its first condition is properly called a larva. The larva of the lamprey (*Petromyzon*) is nearly blind and toothless, with slender head, and was long supposed to belong to a different genus from the adult. The larva of sharks and rays and of some dipnoans are provided with bushy external gills, which disappear in the process of development. In most soft-rayed fishes the embryonic fringe, which precedes the development of the vertical fins, persists for a considerable time.

Hybridism is very rare among fishes in a state of nature. Two or three peculiar forms among the snappers (*Lutianus*) in Cuba seem fairly attributable to hybridism, the single specimen of each showing a remarkable mixture of characters belonging to two common species. Hybrids may be readily made in artificial impregnation among those fishes with which this process is practicable. Hybrids of the different salmon or trout usually share nearly equally the traits of the parent species.

The age of fishes is seldom measured by a definite period of years. Most of them grow as long as they live, and apparently live until they fall victims to some stronger species. It is reputed that carp and pike have lived for a century, but the evidence needs verification. Somes fishes, as the salmon of the Pacific (*Oncorhynchus*) have a definite period of growth (usually four years) before spawning. After this act all the individuals die — so far as known — without exception.

Fishes differ greatly in tenacity of life In general, fishes of the deep seas die at once if brought near the surface. This is due to the reduction of pressure. This forces the stomach out through the mouth and may burst the air-bladder and the large blood-vessels. Marine fishes usually die very soon after being drawn out from the sea. Some fresh-water fishes are very fragile, dying soon in the air, often with injured air-bladder or blood-vessels. They will die even sooner in foul water. Other fishes are extremely tenacious of life. The mud-minnow (*Umbra*) is sometimes plowed up in the half-dried mud of Wisconsin prairies. The related Alaska black-fish (*Dallia*) has been fed frozen to dogs, and has escaped alive from their stomachs after being thawed out. Many of the catfishes (*Ameiurus*) will live after lying half-dried in the dust for hours. The dipnoan (*Lepidosiren*) lives in a ball of half-dried mud during the dry season, and the fishes, mostly Asiatic, which possess an accessory breathing organ, can long maintain themselves out of water.

Some fishes can readily resist starvation, while others succumb as readily as a bird or mammal. The limits of distribution of many fishes are marked by changes in temperature. Few marine fishes can endure any sudden or great change in this regard, although fresh-water fishes adapt themselves to the seasons. Those fishes which are tenacious of life and little sensitive to changes in climate and food are most successfully acclimatized or domesticated. The Chinese carp (*Cyprinus carpio*) and the Japanese goldfish (*Carassius auratus*) have been naturalized in almost all temperate and tropical river-basins. Within the limits of clear, cold waters, most of the salmon and trout are readily transplanted. But some of these, as the grayling, are very sensitive to the least change in conditions. Most of the catfish (*Siluridæ*) will thrive in almost any fresh waters except those which are very cold.

The eggs of many salmon placed on ice to retard their development have been successfully transported to great distances. The king salmon has been thus transferred from California to Australia. It has been found possible to stock rivers and lakes with desirable species, or to restock those in which the fish-supply has been partly destroyed, through the means of artificially impregnated eggs.

Fishes have little power to reproduce lost parts. Only the tips of fin-rays or filaments are thus restored after injury. Sometimes a fish in which the tail has been bitten off will survive the injury. The wound will heal, leaving the animal with a truncate body, fin-rays sometimes arising from the wounds.

Fishes as Food for Man.— Among all races of men fishes are freely eaten as food, either raw, as usually preferred by the Japanese and Hawaiians; or else as cooked, salted, dried or otherwise preferred.

The flesh of most fishes is white, flaky, readily digestible, and with an agreeable flavor. Some, as the salmon, are charged with oil, which tends to give an orange hue known as salmon-color. Others have colorless oil which may be of various consistencies. Some have dark red flesh, which usually contains a heavy oil that becomes acrid when stale. Some fishes, as the sharks, have tough, coarse flesh. Some have flesh which is watery and coarse; some are watery and tasteless. Some, otherwise excellent, have the muscular area, which constitutes the chief edible part of the fish, filled with small bones.

The writer has tasted most of the noted food fishes of the northern hemisphere. First in the ranks as a food-fish (when properly cooked, for he is no judge of raw fish) he would place the eulachon or candlefish (*Thaleichthys pacificus*). This little smelt, about a foot long, ascends the Columbia River, Frazer River, and streams of Southern Alaska in the spring, in great numbers, for the purpose of spawning. Its flesh is white, very delicate, charged with a white and very agreeable oil, readily digested, and with a sort of fragrance peculiar to the species.

Next to this he is inclined to place the ayu (*Plecoglossus altivelis*), a sort of dwarf salmon, which runs in similar fashion in the rivers of Japan and Formosa. The ayu is about as large as the eulachon, and has similar flesh, but with little oil and no fragrance.

Very near the first among sea-fishes must come the pampano (*Trachinotus carolinus*) of the Gulf of Mexico with firm, white, finely flavored flesh.

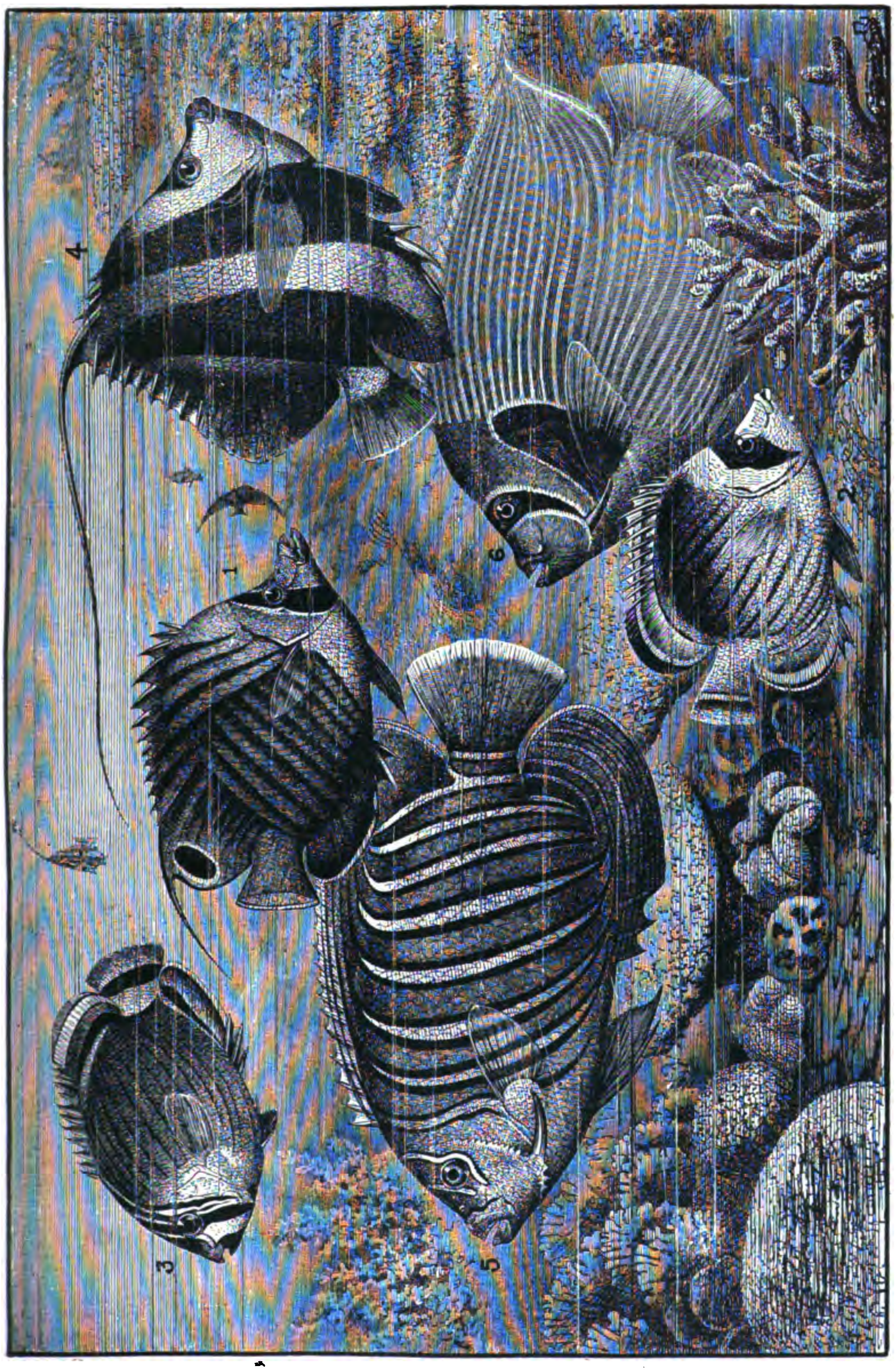
The red surmullet of Europe (*Mullus barbatus*) has been long famed for its delicate flesh, and may perhaps be placed next. Two related species in Polynesia, the *Upeneus bifasciatus* and *Upeneus porphyreus*, are scarcely inferior to it.

Side by side with these belongs the white-fish (*Coregonus clupeiformis*) of the Great Lakes. Its flesh, delicate, slightly gelatinous, moderately oily, is extremely agreeable. It has long been known among hunters that one can eat the flesh of this fish longer than any other without the feeling of cloying. The salmon cannot be placed in the front rank because, however excellent, the stomach soon becomes tired of it.

The Spanish mackerel (*Scomberomorus maculatus*), with flesh at once rich and delicate; the great opah (*Lampris luna*), still richer and more delicate; the bluefish (*Pomatomus saltatrix*), similar, but a little coarser; and the king-fish (*Scomberomorus cavalla*) firm and well-flavored, represent the best of the fishes allied to the mackerel.

The shad (*Alosa sapidissima*), with its sweet, tender, finely oily flesh, stands also near the front among food-fishes, but it runs above all others in the matter of small bones. The weakfish (*Cynoscion regalis*) and numerous relatives rank first among those with tender, white, savorous flesh. Among the bass and perch-like fishes, common consent places near the first the striped bass (*Roccus lineatus*), the bass of Europe (*Dicentrarchus labrax*) the susuki of Japan (*Lateolabrax japonicus*), the red tai of Japan (*Pagrosomus major*), the sheepshead (*Archosargus probatocephalus*), the muttonfish or pargo criollo of Cuba (*Lutianus*

SPINY-FINNED FISHES (Chætodontidæ)



1 The Banner Fish (Chætodon setifer)
2 The Coral Fish (Chætodon fasciatus)
3 The Clipp Fish (Chætodon vittatus)
4 The Lash Fish (Heniochus macrolepidotus)
5 The Prince Fish (Chætodon diacanthus dux)
6 The Emperor Fish (Chætodon imperator)

analis), the European porgy (*Pagrus pagrus*), the uku (*Aprion virescens*) of Hawaii, the spadefish (*Chætodipterus faber*), and the black bass (*Micropterus dolomieu*).

The various kinds of trout have been made famous the world over. All are attractive in form and color; all are gamy; all have the most charming of scenic surroundings; and finally, all are excellent as food-fishes — not in the first rank, perhaps, but well above the second. Notable among these are the European charr (*Salvelinus alpinus*), the American speckled trout (*Salvelinus fontinalis*), the dolly varden (*Salvelinus malma*), and the oquassa trout (*Salvelinus oquassa*). Less attractive are the true trout, the brown trout or Forelle in Europe (*Salmo fario*), the rainbow trout or steelhead (*Salmo irideus*), the Tahoe trout (*Salmo henshawi*), and the cutthroat trout (*Salmo clarkii*) in America; and the Ito-uwo (*Hucho perryi*) of Japan. Not least of all these is the grayling (*Thymallus*), of different species in the streams of northern regions.

All these are the choicest prizes of the angler, and they have few rivals in any part of the world. Other most excellent food-fishes are the eel (*Anguilla* species), the sole of Europe (*Solea solea*), the pike (*Esox lucius*), the muskallonge (*Esox masquinongy*), the sardine (*Sardinella pilchardus*), the atka-fish (*Pleurogrammus monopterygius*) of Bering Sea, the pescado blanco (*Chirostoma estor* and other species) of Lake Chapala in Mexico, the Hawaiian mullet (*Mugil cephalus*), the California pesce rey (*Atherinopsis californiensis*), the Channel catfish (*Ictalurus furcatus*), the turbot (*Psetta maxima*), the barracuda (*Sphyræna*), and the young of various sardines and herring known as whitebait. Of large fishes, probably the swordfish (*Xiphias gladius*), the halibut (*Hippoglossus hippoglossus*), and the king-salmon or quinnat (*Oncorhynchus tschawytscha*) may be placed first. Those who feed on raw fish prefer, in general, the large parrot-fishes (as *Callyodon jordani*) in Hawaii, or else the young of mullet and similar species.

In general, the economical value of any species depends not on its toothsomeness, but on its abundance and the ease with which it may be caught and preserved.

It is said that more individuals of the herring (*Clupea harengus* in the Atlantic; *Clupea pallasii* in the Pacific) exist than of any other species. The herring is a good food-fish, and wherever it runs it is freely caught. According to Björnson, wherever the schools of herring touch the coast of Norway, there a village springs up, and this is true in Scotland, Newfoundland, and from Killisnoo in Alaska to Otaru in Japan and to Strielok in Siberia. Goode estimates the herring product of the North Atlantic at 1,500,000,000 pounds annually. In 1881, Professor Huxley used these words:

> It is said that 2,500,000,000, or thereabouts, of herrings are every year taken out of the North Sea and the Atlantic. Suppose we assume the number to be 3,000,000,000 so as to be quite safe. It is a large number, undoubtedly, but what does it come to? Not more than that of the herrings which may be contained in one shoal, if it covers half a dozen square miles, and shoals of much larger size are on record. It is safe to say that scattered through the North Sea and the Atlantic, at one and the same time, there must be scores of shoals, any one of which would go a long way toward supplying the whole of man's consumption of herrings.

The codfish (*Gadus callarias* in the Atlantic; *Gadus macrocephalus* in the Pacific) likewise swarms in all the northern seas, takes the hook readily, and is better food when salted and dried than it is when fresh.

Next in economic importance probably stands the mackerel of the Atlantic (*Scomber scombrus*), a rich oily fish which bears salting better than most.

Scarcely less important is the great king-salmon or quinnat (*Oncorhynchus tschawytscha*) and the blueback salmon or red salmon (*Oncorhynchus nerka*). The canned product of the latter in Alaska alone amounts to nearly $5,000,000 annually.

The salmon of the Atlantic (*Salmo salar*), the various species of sturgeon (*Acipenser*), the sardines (*Sardinella*), the halibut (*Hippoglossus*), are also food-fishes of great importance.

In the tropics no one species is represented by the enormous numbers of individuals, as is the case in colder regions. On the other hand, the number of species regarded as food-fishes is much greater in any given part. In Havana about 350 different species are sold as food in the markets, and an equal number are found in Honolulu. Upwards of 600 different species appear in the markets of Japan. In England, on the contrary, about 50 species make up the list of fishes commonly used as food. Yet the number of individual fishes is probably not much greater about Japan or Hawaii than on a similar stretch of British coast.

Catching Fishes. — In general, fishes are caught in four ways, by baited hooks, by spears, by traps and by nets. Special local methods, such as the use of the tamed cormorant, in the catching of the ayu, by the Japanese fishers at Gifu, may be set aside for the moment, and all general methods of fishing come under one of these four classes.

Of these methods, the hook, the spear, the seine, the beam-trawl, the gill-net, the purse-net, the sweep-net, the trap, and the weir are most important. The use of the hook is again extremely varied. Sometimes for codfish long sunken lines, each baited with many hooks, are used. For pelagic fish a baited hook is drawn swiftly over the surface, with a «spoon» attached which looks like a living fish. In the rivers the line is attached to a pole, and when fish are caught for pleasure or for the joy of being in the woods, recreation rises to the dignity of angling. Angling may be accomplished with a hook baited with an earthworm, a grasshopper or the larva of some insect. The angler of to-day, however, prefers the artificial fly, as being more workmanlike and also more effective than bait-fishing.

With the mutiplicity of apparatus for fishing, there is the greatest variety in the boats which may be used. The fishing fleet of any part of the world is a most interesting object, as are also the fishermen with their quaint garb, plain speech, and their strange songs and calls with the hauling-in of the net.

Evolution of Fishes. — When a fish dies its body is at once attacked by hundreds of creatures ranging from the one-celled protozoa and bacteria to individuals of its own species. Its flesh is devoured, the bones are scattered, the gelatinous substance in them decays, and the phosphate of lime is in time dissolved in the water. For this reason few fishes of the millions that die each year leave any trace for future preservation. At the most, a few teeth, a fin-spine, or a bone buried in the clay might remain intact or in such condition as to be recognized.

But now and then it happens that a dead fish may fall in more fortunate conditions. On a sea-bottom of fine clay the bones, or even the whole body, might be buried in such a way as to be sealed up and protected from total decomposition. The fish would in any case disappear and leave no mark, or at the most a mere cast of its surface. But the hard parts might persist, and now and then they do persist, the lime unchanged or else silicified or subjected to some other form of chemical substitution. Only the scales, the teeth, the bones, the spines and the fin-rays can be preserved in the rocks of sea or lake bottom. In a few localities, as Fossil Station, near Green River, Wyo., Monte Bolca in Tuscany, and Mount Lebanon in Syria, and in lithographic slates in Germany, many skeletons of fishes have been found pressed flat in layers of very fine rock, their structures traced as delicately as if actually engraved on the smooth stone. About Ceara in Northern Brazil, many cretaceous fishes have been beautifully preserved in nodules of clay, the eyes and even black spots on the scales being distinctly shown. Fragments preserved in ruder fashion abound in the clays and even the sandstones of the earliest geological ages. In most cases, however, fossil fishes are known from detached and scattered fragments, many of them, especially of the sharks, by the teeth alone. Fishes have occurred in all ages from the Lower Silurian or Ordovician to the present time, and no doubt the very first lived before the Silurian.

No one can say what the earliest fishes were like, nor do we know their real relation to the worms, their presumable ancestors, nor to the tunicates and other chordate forms, not fish-like, but still degenerate relatives of the primitive fish.

From analogy we may suppose that the first fishes which ever were, bore some resemblance to the lancelet, for that is a fish-like creature with every structure reduced to its lowest terms. But as the lancelet has no hard parts, no bones, nor teeth, nor scales, nor fins, no traces of its kind are found among the fossils. If the primitive fish was like it in important respects, all record of it has necessarily vanished from the earth. It is, however, by no means proved that the ancestral fishes were really soft-bodied or worm-like. Professor Patton of Dartmouth College has shown many reasons for believing that the earliest known types (*Ostracophores*) were allied to crustaceans, and that from marine forms, ancestors to the modern horse-shoe crab (*Limulus*) and to spiders, the fishes have been derived.

The next group of living fishes the cyclostomes, including the hagfishes and lampreys, fishes with skull and brain but without limbs or jaws, stands at a great distance above the lancelet in complexity of structure, and equally far from the true fishes in its primitive simplicity. In fact, the lamprey is farther from the true fish in structure than a perch is from an eagle. Yet for all that, it may be an offshoot from the primitive line of fish-descent. There is not much in the structure of the lamprey which may be preserved in the rocks and no trace of fossil lamprey is actually known to exist.

The oldest unquestioned fragments of fishes have been very lately made known by Charles D. Walcott, from rocks of the Trenton Period in the Ordovician or Lower Silurian. These are from Cañon City, Colo. Among these is certainly a small ostracophore (*Asterapis desiderata*). With it are fragments of a vertebral column, thought doubtfully to belong to an extinct type of chimæras (*Dictyorhabdus*) and other fragments of bony plates, referred with some doubt to the crossopterygian genus *Eriptychius*. This renders certain the existence of ostracophores at this early period, and their association with chimæras and primitive sharks is also possible. These early remains were from shallow, muddy water, more favorable perhaps for ostracophores than for sharks.

The fish-remains next in age in America are from the Bloomfield sandstone in Pennsylvania, of the Onondaga Period in the Silurian; the earliest in Europe are found in the Ludlow shales, both of these being in or near the horizon of the Niagara rocks, in the Upper Silurian Age.

It is, however, certain that these Ordovician remains do not represent the beginning of fish-life. Doubtless sharks, ostracophores and arthrodires, with perhaps chimæras, crossopterygians, and dipnoans existed at a far earlier period, possibly preceded by unarmed, limbless forms, without jaws, of which no trace whatever has been left.

Next appear more or less simultaneously, in the early or middle Silurian, fin-spines, thought to belong to primitive sharks, remains of acanthodean and other sharks and with these numerous bony shields of the mailed ostracophores, and somewhat later those of the more highly specialized arthrodires. Later appear cestraciont sharks, chimæras, dipnoans and crossopterygians.

In the Devonian Age the ostracophores increase in size and abundance, disappearing with the beginning of the Carboniferous. The arthrodires also increase greatly in variety and in size, reaching their culmination in the Devonian, but not disappearing entirely until well in the Carboniferous.

These two groups (often but wrongly united by geologists under the older name placoderms, given by McCoy), together with sharks and chimæras, made up almost exclusively the rich fish-fauna of Devonian times. The name ganoid has been associated with these forms but the true *Ganoides* are genuine fishes. The sharks were chiefly acanthodian and cladoselachean (*Pleuropterygii*), so far as our records show. The supposedly most primitive known type, that of *Cladoselache*, appeared in the middle Devonian. The *Ichthyotomi* (*Pleuracanthus*), sometimes regarded as still more primitive, are not known before the Carboniferous. In any case it is clear that the records of early shark-life are still incomplete. Chimæroids abound in the Devonian, and with them a considerable variety of crossopterygians and dipnoans. The true fishes appear also in the Devonian, in the guise of ganoid ancestors and relatives of *Palæoniscum*, all these with diamond-shaped enameled scales. In the Devonian too, we find the minute, lamprey-like forms (*Palæospondylus*), our ignorance of which is concealed under the name *Cycliæ*.

In the Carboniferous Age the sharks increase in number and variety, the ostracophores disappear and the arthrodires follow them soon after, in the Permian. Other forms of dipnoans, crossopterygians and some ganoids follow, giving the fauna a somewhat more modern aspect. The *Acanthodei* and *Ichthyotomi* pass away with the Permian, which follows the period of coal.

In the Triassic the earlier types of ganoids or mailed fishes of relatively modern type give place to forms approaching the gar-pike and sturgeon. The crossopterygians rapidly decline. The dipnoans are less varied and fewer in number, and notidanoid sharks made their first appearance. All the ancient types of shark meanwhile have passed away, the *Cestraciontes* being the only group continued from the Permian to the Triassic. Here are found the first true bony fishes, derived from ganoid stock, the allies and predecessors of the great group of herrings. These become more numerous in the Jura, and in this age appear other forms which give the fish-fauna of this period something of a modern appearance. In this age the sharks become divided into several groups, *Notidani*, cat-sharks, lamnoid sharks, angel-fishes, skates and finally typical sharks, being well differentiated from each other. Chimæras are still numerous. The *Acanthodei* have passed away, as well as the mailed ostracophores and arthrodires. The dipnoans and crossopterygians are few. The early ganoids have given place to more modern types, still in great abundance and variety.

This condition continues into the Cretaceous Period. Here the rays and modern sharks increase in number. The ganoids hold their own, and other groups of soft-rayed fishes, as the smelts, the lantern-fishes, the pike and the flying-fishes, join the group of herring-like forms which represent the modern bony fishes. In the Cretaceous appear the first spiny-rayed fishes, derived perhaps from pike-like forms, the ancestors of the living genus *Beryx*. From the berycoids spring the perch-like and mackerel-like forms so numerous in recent times.

In the Eocene great changes have taken place. The early families of bony fishes nearly all disappear. The herring, pike, smelt, salmon, flying-fish and berycoids remain and a multitude of others seem to spring up to replace them. Among these are the bowfins, the globe-fishes, the trigger-fishes, the catfishes, the eels, the butterfly-fishes, the porgies, the perch, the bass, the pipe-fishes, trumpet-fishes, the mackerels and the John-dory, with the sculpins, the anglers, the flounders, the blennies and the cods. That all these groups, generalized and specialized, arose at once is impossible, although all seem to date from Eocene times. Doubtless all of them had their origin in earlier times and the simultaneous appearance is related to the fact of the thorough study of Eocene shales which in numerous localities (Green River, London, Monte Bolca, Licata, Mount Lebanon) have been especially favorable for the preservation of their forms. Practically fossil fishes have been studied only in a very few parts of the earth. Scotland, England, Germany, Italy, Switzerland, Syria, Ohio and Wyoming have furnished the great bulk of all the fish-remains in existence. In some regions perhaps collections may be made which will give us a more just conception of the origin of the different groups of bony fishes. We can now only say with certainty that the modern families were largely existent in the Eocene, that they sprang from ganoid stock, found in the Trias and Jura, that several of them occurred in the Cretaceous also, that the berycoids were earliest of the spiny-rayed fishes and forms allied to herring the earliest of soft-rayed forms. Few of the modern genera go back to the Eocene; many of them arose in the Miocene; and few species have come down to us from rocks older than the end of the Pliocene. The general modern type of the fish-faunas was determined in the later Cretaceous and the Miocene; the changes which bring us to recent times have largely concerned the abundance and variety of the individual species. From geological distribution we have arising the varied problems of geographical distribution and the still more complex conditions on which depends the extinction of species and of types.

For much information on the fishing apparatus in use in America, the reader is referred to the reports of the Fisheries in the 10th census (1880), under the editorship of Dr. G. Brown Goode. In these reports Goode, Stearns, Earll, Gilbert, Bean and the present writer have treated very fully of all economic relations of the American fishes. In an admirable work entitled 'American Fishes' Dr. Goode has fully discoursed of the food and game fishes of America, with especial reference to the habits and methods of capture of each. A later work of the same character is 'Food and Game Fishes of America,' by Jordan and Evermann. A still more elaborate work is the 'Guide to the Study of Fishes,' by the present writer. To these sources and to many others of similar purport in other lands, the reader is referred for an account of the economic and the human side of fish and fisheries. See FISHES, GEOGRAPHICAL DISTRIBUTION OF; ICHTHYOLOGY.

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FISH, Royal, certain large fish, such as the whale, which by the common law of England become the property of the king when thrown on shore or trapped near the coast. It is a remarkable exception to the rule that animals of a wild nature (*feræ naturæ*) belong to him who first secures possession of them. See GAME LAWS.

FISH-CROW, a small species of crow (*Corvus ossifragus*), with a violet-green head, found along the Atlantic and Gulf coasts, where it limits its wanderings to the sea-coast and tidal rivers, finding its food mainly along the beaches. It is perhaps the most destructive robber of birds' nests in the country. A similar species (*Cornus minutus*) inhabits Cuba. Consult Ridgway, R., 'The Birds of North and Middle America, etc.' (Part III, Washington 1904). See CROW.

FISH CULTURE, or PISCICULTURE, the artificial propagation, fertilization, breeding, rearing, training and protecting of fishes, particularly food-fish. The art or industry was known in the early ages in China, and later in Germany and Sweden. In 1350, a monk, Dom Pinchon, hatched fish eggs by an artificial process, but the honor of introducing the modern plan of propagation is generally conceded to Stephen L. Jacobi, a Prussian soldier of Westphalia, who, in 1763, devised the process now in use in Europe and the United States, of stripping the ova from the female fish and mixing them with milt taken from the male. Fifty years after Jacobi's discovery, Joseph Remy, a fisherman of the Vosges Mountains, made the further discoveries upon which the culture depends — that the impregnation of fish eggs differs from that of all other oviparous animals in taking place after all eggs have left the body of the creature and can therefore be performed as well artificially as by the animals themselves.

The first government fish culture station was established in 1850 at Hüningen, Alsace, and the following year a similar institution was established on the Tay in Great Britain. The process was introduced in the United States in 1865, when Dr. Garlick of Cold Springs, N. H., imported salmon eggs from Canada to hatch in the waters of his trout ponds. The process was also introduced in other sections of the country. The United States Commission of Fish and Fisheries, established by Congress 9 Feb. 1871, embraced in the scope of its work «the propagation of useful food-fishes, including lobsters, oysters and other shellfish, and their distribution to suitable waters.»

Technically, the process now in use consists in taking the ripe eggs from the female fishes and the milt from the male, mixing them artificially and leaving them until impregnation has been effected, after which the eggs separate of themselves and are placed in water, washed and treated in different ways according to the species or variety of the fish. Those of the salmon are placed in a filter-box or trough, through which passes a stream of pure water and left to hatch into «fry,» which process takes from 35 to 70 days. The advantage of pisciculture consists in the saving of multitudes of eggs which would otherwise be lost, the protection of the young fish from the dangers incident to their exposed condition and the transplantation of species and varieties to other localities, where they soon become naturalized.

The operation for obtaining the ova and milt consists simply in pressing the body of the fish from the head toward the tail and in collecting the excluded particles in a common vessel; the contents are occasionally put in motion in order to prevent the growth of parasites upon the eggs, which are very sure to destroy them. A low temperature and even desiccation is not necessarily fatal, so that many kinds in a nearly mature state may be transported for considerable distances. It has been estimated that 1,000,000 trout may be raised in this way at a cost of less than $200. Fish readily adapt themselves to new localities. Pickerel were easily introduced into ponds in Berkshire County, Mass., and the great pike of the northern lakes have been transplanted to the Connecticut River. The salt water smelt lives contentedly in ponds at Jamaica, Mass., and the tantog has found a new home in Massachusetts Bay. The expense of fish culture is small and the labor slight. There have been numerous inventions to aid the fish culturist, among them McDonald's fish-hatching jar which keeps the eggs in motion and automatically separates the dead fish from the living.

The United States government has established large salmon-breeding establishments in California and in Maine. It operates 34 hatcheries in various localities, owns four railroad cars for transporting eggs and young fish and a steamer, the *Fishhawk*, is under its supervision. The vessel is in reality a floating hatchery. Western waters have been stocked with Eastern fish and exhausted streams have been restored with a new supply. In 1901 the government handled either as eggs, fry, fingerlings, yearlings or adults 3,863,000,000 in United States waters. Of this number nearly one-fifth were shad and one-fourth whitefish.

Aquatic birds are known to be of more or less assistance to the government in the dissemination of fish spawn. Naturalists tell us that these birds frequently carry the eggs from river to river and from lake to lake, by having their feet covered with the eggs. In the course of their flight the birds come to an inland sheet of water or small creek, where they dive in or wade into the water and the eggs are washed from their feet. In this way the waters become populated with new species and propagation progresses.

Fish culture has been found exceedingly profitable, too, as a private business or industry. There are over 400 fish hatcheries in Europe, and more than one-half of these are owned by individuals. The Trout Pond Association, at Cold Springs, N. H., which began business in 1866, added a black bass branch in 1868, and erected salmon-breeding works in 1879, which in the first year yielded 450,000 eggs.

Several of the States have organized independent State Fish Commissions for the express purpose of disseminating the «fry» of food-fish in public waters. This is true of New York, whose commission of five members is appointed by the governor. The commission has established five hatcheries for the propagation of the «fry» from the eggs of the female fish, as follows: The Adirondack, Saranac; Cold Spring, Long Island; in Franklin County; Old Forge in the Fulton chain; at Newton Corners, and in Chautauqua County.

Bibliography.—Armistead, ‘Angler's Paradise’ (London 1895); Bund, ‘Fishery Management’ (ib. 1899); Day, ‘Fish Culture’ (ib. 1883); Gobin, ‘La pisciculture en eaux douces’ (Paris 1889); id., ‘La pisciculture en eaux salées’ (ib. 1891); Maitland, ‘On the Culture of Salmonidæ and the Acclimatization of Fish’ (London 1883); Mather, ‘Modern Fish Culture’ (New York 1900); Max von dem Borne, ‘Fischzucht’ (Berlin 1881); Meehan, ‘Fish Culture’ (New York 1913); Stone, ‘Domesticated Trout’ (Charlestown, N. H., 1877); Townsend, ‘Cultivation of Fishes in Natural and Artificial Ponds’ (New York 1907); ‘Annual Reports’ of the United States Fish Commission (Washington 1871 et seq.); ‘Bulletins’ of the United States Fish Commission (ib. 1882 et seq.); 'Manual of Fish Culture,' issued by the United States Bureau of Fisheries (ib. 1900).

FISH DAVIT, in shipbuilding, a spar or small crane projecting from the bow of a ship for the suspension of the tackle, called the fish fall, used in hauling up the arms of the anchor in getting it abroad. The fish davit is such a distance abaft the cat-head as the length of the anchor may require, and is used to lift the fluke of the anchor to the bill-board; a roller keeps the fluke from bruising the vessel's side.

FISH DUCK, a merganser (q.v.).

FISH AND FISHERIES, Commission of, in the United States, was created by Congress in 1870, headed by the Commissioner of Fish and Fisheries, with an assistant commissioner. When in 1903 the Department of Commerce and Labor was created, its name was changed to Bureau of Fisheries and it became part of the new department. At the time of the subdivision of the latter, it was attached to the Department of Commerce. Originally it collected statistics of fisheries in the country, investigated the life histories and food of fish, and conducted experiments. Its functions, however, have been extended from time to time and now it embraces the following divisions: Scientific Division; Division of Inquiry Respecting Food Fishes; Statistical Division; Fish Culture. It is also charged with the enforcement of laws relating to the fur-bearing animals in Alaska. The bureau issues four series of publications; annual reports of the Commissioner and special papers on the different divisions of the bureau; annual bulletins containing technical papers; economic circulars and reports; statistical bulletins. Consult the above, all published in Washington, and Franc, A., 'Use Your Government' (New York 1918).

FISH-FLY, one of the aquatic neuropterous insects of the family *Sialidæ*, and especially of the genus *Chauliodes*, represented by the hellgrammite and other species whose crawling larvæ are useful as fish-bait. See CORYDALIS.

FISH-HAWK, or OSPREY. This almost cosmopolitan bird is known throughout North America as the «fish-hawk,» never in popular speech as «osprey.» The species (*Pandion haliaëtus*) occurs on all continents, gathering in the neighborhood of the sea and other large bodies of water, where it dexterously procures the living fish that constitute its food, by plunging from a great height and seizing them in its talons. These gains it is frequently obliged to relinquish to the fish-loving sea-eagles, especially our own bald eagle, which pounces upon the osprey and forces it to drop its property to be caught and swallowed by the robber. Fish-hawks have increased rather than diminished in most of their American haunts where they are protected by law and good-nature, and for the picturesqueness they lend to the landscape. Their nests are huge masses of sticks, placed on a ledge of rocks, or along low shores, in trees, and reoccupied for a long series of years. On the New England coast fish-hawks often make nests in belfries or on platforms set up on stout poles for their accommodation. In the absence of trees it will form a great heap of sticks on the ground. The eggs are dirty white, marked with irregular purplish and red-brown blotches. This fine hawk (*Pandion haliaëtus*) is about 25 inches long, and has long pointed wings giving it great power and grace in flight. The general color of the upper parts is brown, but the head, neck and all under parts are white, except a band of brown spots across the breast. It stands alone among falconiform birds in a family (*Pandionidæ*) equivalent in rank to the *Falconidæ*, from which it essentially differs in the reversibility of the outer toe; the toes are nearly equal, and have no connecting membrane, but with spicules on their under surfaces and much curved claws enabling the birds to take a firm hold of their slippery prey. A general guide to further information as to the osprey in the Old World may be found in Newman's 'Dictionary of Ornithology'; and as to the American fish-hawk, in Dr. Fisher's 'Hawks and Owls of the United States'; Barrows' 'Birds of Michigan' and other books mentioned under BIRD.

FISH-KILLER, one of the huge hetoropterous bugs (q.v.) of the aquatic family *Belostomidæ*, some of which reach a length of four inches, and are able to overcome small fishes. They are oval in outline, dull brown in color, and possess powerful mouth-parts by which they first stab their prey, then seize it and suck its blood. Their legs are flattened, and form powerful paddles, but are also useful for walking; and, supplied by the bubbles of air they take down with them, these big bugs lurk on the muddy bottoms of sluggish waters, ready to rush at and capture their living food. They are highly destructive among the fry in piscicultural ponds, and should be carefully eradicated. They come out of the water in early summer and fly in swarms at night, gathering about lights: and in some places so throng the street-lamps that they have become known as «electric-light bugs.» Consult Howard's 'Insect Book' (1901); and see FRESH-WATER INSECTS.

FISH-LICE, any of many copepod crustaceans, mainly of the group *Siphonostoma*, parasitic on marine animals. All are of small size, often very unlike ordinary *Copepoda* (q.v.) in appearance, and usually transparent. They are born of eggs attached to stones, plants and the like, and begin life as normal larvæ, but some become parasitic and retrograde; yet some species are able as adults to swim about and change their hosts. These copepods attach themselves to the host by the suckers at the mouth, or by a sucking probiscis, and in some cases by hooks on the forward swimming appendages. While generally they confine their attacks to the exterior of the host, some live in the gills of fishes, and others embed themselves in the muscles. *Argulus* is a temporary epizoön. With four pairs of swimming-feet, it moves freely, and is not confined to a single host, entering the gills of a fish, there living for a time, and then enjoying a free life until it is hungry, when it enters another host. *Caligus* is sessile, and attaches itself to the gills of a fish, on whose blood it lives permanently. *Lernea*, and related forms, are worm-like, and anchor in the gills or in the skin of all kinds of fishes, and are sometimes so numerous as finally to cause the death of the host. Not only fishes, but all sorts of marine animals, including whales, are infested by these parasites, which have been extensively studied and reported upon by the United States

Fish Commission, whose publication should be consulted.

FISH MANURE, fertilizer obtained from dried or ground fish, or fish guano. The chief sources of such fertilizers are the refuse from fish packing and canning factories and the pomace from the extraction of oil from fish. Such fertilizer is valuable as a source of nitrogen, which sometimes amounts to 8 per cent. Fish manure is prepared in large quantities in Norway, in the North Atlantic coast and the North Pacific coast of the United States, and in general wherever there is abundant material. Consult Aikman, ‘Manures and the Principles of Manuring’ (Edinburgh 1894); Voorhees, ‘Fertilizers’ (New York 1912); Turrentine, ‘The Fish Scrap Fertilizer Industry of the Atlantic Coast’ (United States Department of Agriculture, Bulletin 2); ‘American Fertilizer Handbook’ (Philadelphia 1913).

FISH OF PARADISE. See PARADISE FISH.

FISH TRAP, a box or basket set in a river, and containing bait to attract fish. A basket, net or staked area with a divergent-sided or funnel-shaped opening through which fish pass, and in which they find a difficulty in retracing their course, owing to obstacles or blind sacs.

FISHER, Albert Kendrick, American biologist: b. Ossining, N. Y., 21 March 1856. He was graduated at the College of Physicians and Surgeons of Columbia University in 1879, was with the Death Valley Expedition of 1891, sent out by the Department of Agriculture, and which made biological surveys of portions of California, Nevada, Arizona and Utah. He also made biological surveys in various other Western States and was a member of the Harriman Alaska expedition of 1899. Since 1906 he has been in charge of the economic investigations of the United States Biological Survey. He was a founder of the Amercan Ornithologists' Union. He has published ‘Hawks and Owls of the United States’ (1893); ‘Ornithology of the Death Valley Expedition of 1891’ (1893), and bulletins of the Department of Agriculture of the United States.

FISHER, Alvan, American artist: b. Needham, Mass., 1792; d. Dedham, Mass., 1863. He studied art under difficulties, but painted rural scenes and portraits with financial success which permitted him to travel and study in Paris in 1825. On his return to America, he was represented in a successful exhibit of paintings at Boston in 1831 along with Harding, Alexander and Doughty, an association which became known as the «Boston group of artists.» His talent henceforth was chiefly devoted to portraiture, some of which is notable, especially his picture of Spurzheim.

FISHER, Andrew, Australian statesman: b. Kilmarnock, Scotland, 29 Aug. 1862. He went to Queensland in 1885, and entered Parliament there in 1893. He was Minister of Railways in the Dawson Cabinet of 1899. He represented Wide Bay in the Commonwealth Parliament for the first 15 years of the Parliament; was Minister of Trade and Customs in 1904 and in 1907 became leader of the Federal Parliamentary Labor party. He was Prime Minister of the Commonwealth in 1908–09, but was defeated on the issue of adequate defense for Australia. He was again Prime Minister in 1910–13 and 1914–15. He resigned office and in 1916 was appointed High Commissioner of Australia in England.

FISHER, Clara, American actress: b. London, England, 14 July 1811; d. Metuchen, N. J., 12 Nov. 1898. She made her first appearance on the stage in London when six years old, as Lord Flimnap in ‘Gulliver in Lilliput.’ Her success at this early age was phenomenal. Later under the direction of her parents she made tours of the United Kingdom, and besides other parts played Norval and Sir Peter Teazle for five years with great financial success. She made her first appearance in the United States as Albina Mandeville in ‘The Will’ at the Old Park Theatre in New York in 1827. Her success was immediate. Later she visited all of the larger cities of the Eastern, Southern and Western States. In 1834 she married James Gaspard Maeder, a well-known musician, and settled in Albany, N. Y. She, however, continued on the stage till 1889, when she retired.

FISHER, Frederic Henry, English journalist: b. London, 13 April 1849. He has been editor of the *Literary World* from 1883 and has published ‘Cyprus, Our New Colony, and What We Know About It’ (1878); ‘Afghanistan and the Central Asian Question’ (1878).

FISHER, George Jackson, American physician: b. Westchester County, N. Y., 27 Nov. 1825; d. 1893. He was graduated from the medical department of New York University in 1849; was physician and surgeon at Sing Sing State Prison 1853–54; surgeon to the 7th Brigade National Guard, State of New York, in 1853–73; and president of the New York Medical Society in 1874. He succeeded Dr. Samuel D. Gross as the contributor of a ‘History of Surgery’ to the ‘International Encyclopædia of Surgery’ (1886). He published ‘On Animal Substances Employed as Medicines by the Ancients’ (1862); and many other professional monographs.

FISHER, George Park, American educator: b. Wrentham, Mass., 10 Aug. 1827; d. 20 Dec. 1909. He was graduated at Brown University in 1847; studied theology at the Yale Divinity School, at Andover, and in Germany, was professor of divinity 1854–61, and subsequently of ecclesiastical history at Yale. In 1901 he became professor emeritus. He was a famous teacher and a prolific writer. In 1898 he was president of the American Historical Association. He is the author of ‘Essays on the Supernatural Origin of Christianity’ (1865); ‘History of the Reformation’ (1873); ‘The Beginnings of Christianity’ (1877); ‘Faith and Rationalism’ (1879); ‘The Christian Religion’ (1882); ‘The Grounds of Historic and Christian Belief’ (1883); ‘Manual of Christian Evidences’ (1890); ‘Colonial History of the United States’ (1892); ‘Manual of Natural Theology’ (1893); ‘History of Christian Doctrine’ (1896); ‘Brief History of the Nations’ (1890), etc.

FISHER, Harrison, American artist: b. Brooklyn, N. Y., 27 July 1876. He was educated by his father and at the Mark Hopkins Institute of Art, San Francisco. At 16 he began his career of illustrator for a San Francisco paper and subsequently joined the staff of *Puck*. He is now illustrating for *The Saturday Evening Post, McClure's Magazine, Life, Puck,* the *Ladies' Home Journal, Scribner's,* etc. He published ‘The Harrison Fisher Book,’ a collection of drawings (1907).

FISHER, Irving, American political economist: b. Saugerties, N. Y., 27 Feb. 1867. He was educated at Yale (A.B., 1888; Ph.D., 1891), where he remained as member of the faculty, becoming professor of political economy in 1898. He spent 1893–94 in study at Berlin and Paris. From 1896 to 1910 he edited the *Yale Review.* He was a member of Roosevelt's National Conservation Commission. He is president of the American Association for Labor Legislation and Fellow of the American Statistical Association. He is a member of the American Economic Association and many other societies. He has published ‘Mathematical Investigations in the Theory of Value and Prices’ (1892; trans. French, 1916); ‘Elements of Geometry,’ with Prof. A. W. Phillips (1896, trans. into Japanese 1900); ‘Bibliography of Mathematical Economics’ in (and assisted in translating and editing) Cournot's Mathematical Theory of Wealth’ (1897); ‘A Brief Introduction to the Infinitesimal Calculus’ (1897, trans. into German 1904, Italian 1909); ‘The Nature of Capital and Income’ (1906, trans. into French 1911, Japanese 1913); ‘The Rate of Interest’ (1907, Japanese condensation with ‘Nature of Capital and Income,’ 1912); ‘National Vitality’ (1909); ‘The Purchasing Power of Money’ (1911, trans. into German and French 1916); ‘Elementary Principles of Economics’ (1912); ‘Why is the Dollar Shrinking?’ (1914); ‘How to Live,’ joint author with Dr. E. L. Fisk (1915); also numerous articles, monographs, etc.

FISHER, John, English prelate: b. Beverley, Yorkshire, 1459; d. London, 22 June 1535. He was educated at Michaelmas College, Cambridge, graduating in 1487. In 1501 he was made vice-chancellor of the University of Cambridge (chancellor 1504), and in 1503 became the first Margaret professor of divinity at Cambridge and in the same year president of Queen's College. In 1504 he was promoted to the see of Rochester. Deeply prepossessed in favor of the ancient faith he opposed with zeal and perseverance the principles of Luther and his followers. But the same conscientious motives which induced Fisher to become the champion of Henry VIII impelled him to offer resolute opposition to the king's measures for procuring a divorce from his wife, and declaring himself head of the Church. In 1527 he was the only prelate who had the courage to refuse to sign a declaration that the marriage of the king was unlawful. He was subsequently sent to the Tower for refusing to submit to the provisions of an act of Parliament which annulled the king's marriage with Catharine of Aragon and confirmed his subsequent union with Anne Boleyn. Pope Paul III thought proper to reward his zealous adherent by giving him a cardinal's hat (May 1535). The king exclaimed in a passion, «Mother of God! he shall wear it on his shoulders, for I will leave him never a head to set it on.» As no evidence against him existed sufficiently strong to affect his life, Henry employed crafty emissaries to entrap Fisher into a positive denial of the king's supremacy in the Church. The plot succeeded, the bishop was tried and convicted, and was beheaded on Tower Hill. Bishop Fisher was an able theologian, genuinely attached to learning, and the author of a commentary on the Seven Penitential Psalms; of sermons, controversial and devotional treatises, etc.; his writings being partly in Latin, partly in English. Consult his ‘Life’ by Lewis, ed. by Turner (1855); and by Bridgett (1890); Mason, ‘Lectures on Colet, Fisher and More’ (1888).

FISHER, Sir **John Arbuthnot,** 1st Baron Fisher of Kilvorstone, British naval officer: b. 25 Jan. 1841, the son of Capt. William Fisher, 78th Highlanders. He entered the navy in 1854, took part in the capture of Canton and Peiho forts. He served in the Crimean War; in the China War of 1859–60; and was in command of the *Inflexible* at the bombardment of Alexandria, 1882, taking part in the subsequent campaign. He was director of naval ordnance 1886–91, one of the Lords of the Admiralty 1892–97, and commander-in-chief on the North American and West Indies station, 1897–99. He was British naval representative at the Peace Conference at the Hague, 1899; commander-in-chief in the Mediterranean, 1899–1902; was Second Sea Lord of the Admiralty, 1902–03; and commander-in-chief at Portsmouth, 1903–04. From 1904–10 he was First Sea Lord of the Admiralty, and he made it a condition of his acceptance of office that he should be allowed a free hand in the introduction of sweeping reforms. He began by improving the discipline of the service, «scrapped» no fewer than 150 obsolete warships, and created a system of nucleus crews that added to the efficiency of the fleet. When he took up office the British fleet was distributed over the Seven Seas; but profiting by the teaching of Mahan on the lessons of sea power, and on the principle that «your battleground should be your drill ground» he made the North Sea instead of the Mediterranean the headquarters of the British fleet, concentrating 86 per cent of the battleship strength in or near its waters, and forming a «pivot» fleet between it and the Atlantic. In massing his ships on the North Sea he showed a sure anticipation of his country's requirements consequent on the rise of Germany as a sea power, and subsequent events have justified his policy. He was the pioneer in the introduction of the all-big-gun ships, the dreadnoughts and battle cruisers, and other successful modern types of warship. Toward the end of 1914 he succeeded Prince Louis of Battenburg in his old post as First Sea Lord, and to him fell the task of planning to avenge the British disaster off Caronel, and to cope with the German submarine menace. He opposed the employment of capital ships in the attack by Allied forces on the Dardanelles, a campaign favored by Mr. Winston Churchill, his civil chief; his objections were overborne, capital ships were lost in the undertaking and he resigned. Since that time his services have been utilized as chairman of the Inventions Board. He received the Order of Merit in 1905, and in 1909 he was raised to the peerage.

FISHER, Sydney Arthur, Canadian statesman: b. Montreal, P. Q., 12 June 1850. He was educated at the Montreal High School and at McGill University and Trinity College, Cambridge. He gave his attention to scientific farming, fruit growing, and the raising of live stock. He entered the Parliament of Canada as Liberal member for Brome County in 1882, securing re-election in 1887, 1896, 1900, 1904 and 1908. He was Minister of Agriculture in the Laurier Cabinet from 1896 to 1911. He was chosen first vice-president of the International Institute of Agriculture, convened at Rome in 1908. He has written 'Some Economic Aspects of Agriculture in Canada'; 'Conservation of Our Natural Resources'; 'Rural Education in the Province of Quebec'; 'Canada and its Position in the British Empire.'

FISHER, Sydney George, American lawyer and historical writer: b. Philadelphia, Pa., 11 Sept. 1856. He was graduated at Trinity College 1879, studying law at Harvard, and being admitted to the bar 1883. His works include 'The Evolution of the Constitution' (1887); 'The Making of Pennsylvania' (1896); 'Pennsylvania: Colony and Commonwealth' (1897); 'Men, Women and Manners in Colonial Times' (1898); 'The True Benjamin Franklin' (1899); 'The True William Penn' (1900); 'The True History of the Revolutionary War' (1902); 'The Struggle for American Independence' (1908); 'The True Daniel Webster' (1911). He has written many legal articles and articles on public questions, game, bird preservation and nature study. In 1880 while still a student he wrote for the New York *Nation* one or two letters signed F. S. S., which led to the formation of the Civil Service Reform Association, which has accomplished so much in introducing the merit system instead of the spoils system in appointments to office. In later years his magazine articles on the effects of immigration had much to do with the formation of the Immigration Restriction League.

FISHER, Walter Lowrie, American public official: b. Wheeling, Va., (now W. Va.), 4 July 1862. He was educated at Marietta College and Hanover College, was admitted to the bar in 1888 and practised at Chicago from 1888 to 1911. From 1911 to 1913 he was Secretary of the Interior in the Cabinet of President Taft. He was member of the executive committee of the Municipal Voters' League, and in 1908–09 was president of the Conservation League of America. He has published 'Address on Alaskan Problems' (1911), and 'Alaskan Coal Problems' (1912).

FISHER, William Arms, American musician and composer: b. San Francisco, Cal., 27 April 1861. He was a pupil in counterpoint, canon and fugue of H. W. Parker; in composition of Dvořák, and in singing of William Shakespeare. In 1897 he became an editor for Oliver Ditson and Company, the Boston music-publishers. His compositions number an 'Elegie' for violin and piano, some 40 solo songs, a volume of 60 Irish songs and many part-songs and anthems.

FISHER, or **PEKAN** (*Mustela pennanti*), a fur-bearing animal, the largest of North American martens; also called pennants, black cat or black fox. In the fur market it is commonly called Canadian fisher and its pelt is valued at prices but little lower than the sable. The fisher has a range throughout the wooded regions of North America between the parallels 35° and 65°. It chooses locations which are near water, quite the opposite of its near relative, the pine marten, with which it battles fiercely. The animal has a body from two to three feet in length, with a tail about one foot long. In color it is black or very dark gray. It breeds in a hole high up in a tree, having from two to four young in the litter. See also MARTEN.

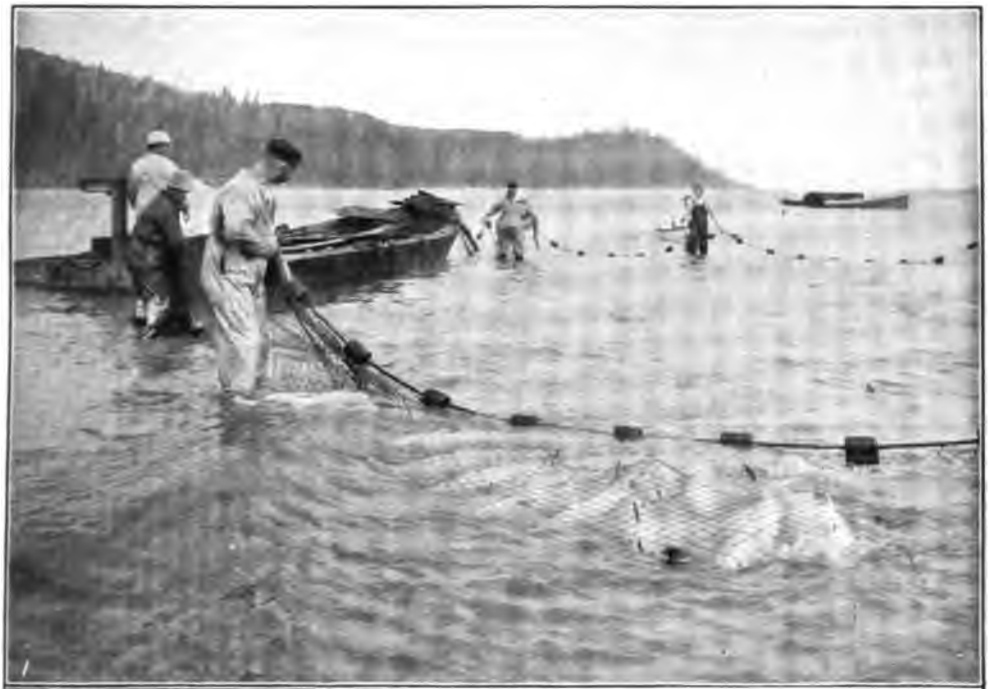
FISHERIES, a term which includes the taking of all kinds of water products as a business and thus applies to the pursuit of whales, seals, otters and other mammals; to the hunting of frogs, turtles and alligators; to the taking of oysters, clams, lobsters, crabs, shrimp and other shellfish; and to the gathering of corals, sponges and seaweeds, as well as to the capture of fish proper. Closely related to the fisheries is fish culture, by which the supply of water animals is maintained and increased; and the various shore industries having for their object the utilization or preservation of the products as brought in by the fishermen.

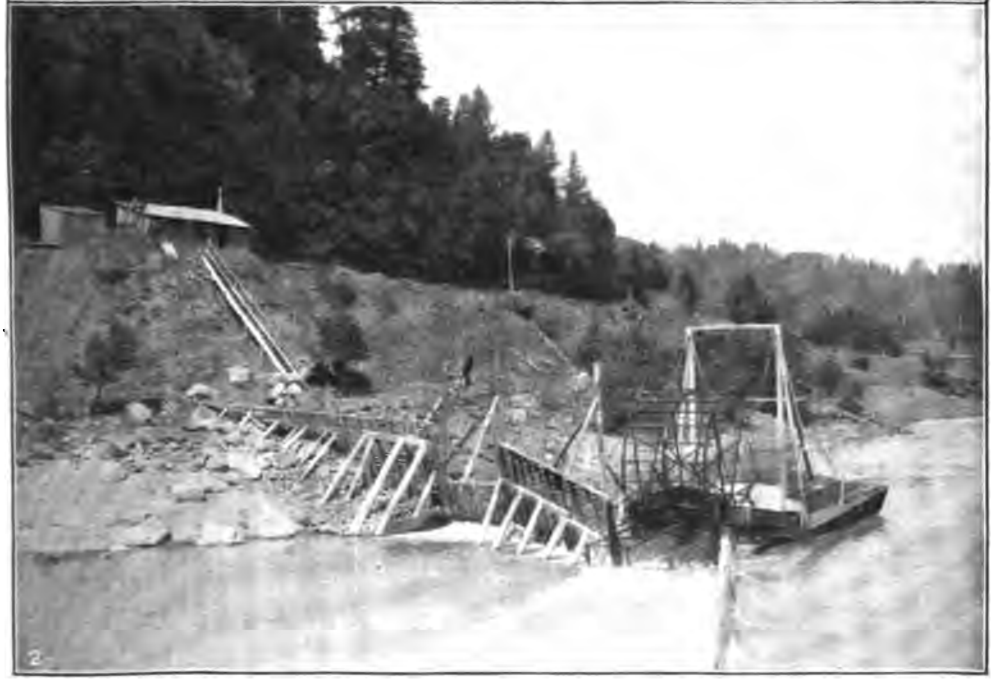
The countries whose fisheries are of greatest commercial importance, being worth upward of $5,000,000 yearly, are the United States, Great Britain, Japan, France, Canada, Russia, Norway, Germany and the Netherlands, in the order given. Countries which may be regarded as of second-rate importance in this respect, whose fisheries are worth between $1,000,000 and $5,000,000 annually, are Portugal, Spain, Sweden and Italy. No data are available for China and India, whose fisheries must be very extensive, and perhaps entitled to rank with those of the leading countries. An estimate based on official data and all other available information gives $350,000,000 as the approximate annual value of the commercial fisheries of the world. Water animals which are of great economic importance in both hemispheres are whales, seals, sea-herring, mackerel, tunny, cod, halibut, lobsters, shrimp, oysters and sponges. The most valuable of all fishery products are oysters; the most valuable of all fishes are sea-herring, salmon and cod.

United States.— The importance attained by the United States fisheries has been due to the abundance, variety, excellence and wide distribution of the products, augmented by cultivation and acclimatization. The abundance of food fishes had a marked influence on the original colonization of the country and was also an important factor in the subsequent development of various regions. At the outbreak of the Revolutionary War, some of the vessel fisheries had already become very extensive and sailor-fishermen, mostly from New England, manned our naval vessels and privateers and rendered valiant service.

For the years between the regular decennial fisheries census, returns are but fragmentary. For 1915 it is estimated that they exceed those of 1908 by about 2 per cent. According to the fisheries census, last compiled by the Census Bureau (for the calendar year 1908), the number of persons engaged in the fisheries of the United States in that year was 143,881, of whom 141,031 were sea fishermen and 2,850 shoresmen. The capital employed was $42,021,000, of which $13,806,000 was the value of the vessels; $7,269,000 of the open boats; $13,025,-

FISHERIES





1 Seining for Salmon on the Columbia River

2 Fish Wheel at Cascades, Columbia River

000 the value of apparatus and appliances; $5,342,000 the value of shore property; and $2,579,000 the amount of cash capital invested. The number of fishing vessels was 6,933 (aggregating 126,453 tons) and the number of open boats and vessels under 5 tons burden was 83,548. The equipment of the fisheries was 233,256 gill nets; 81,191 fyke and hoop nets; 16,104 pound nets, trap nets and weirs; 7,966 seines; and 17,787 other nets; lines valued at $476,000; dredges, tongs and rakes valued at $375,000. The total value of the catch was $54,031,000, representing an aggregate weight of 1,893,450,000 pounds — including the weight only of the edible parts of the oysters, clams, scallops, etc. Of the total catch 60 per cent was taken with nets and seines, 8 per cent with lines and baited hooks and 7 per cent with dredges and rakes. Of the whole, food fish amounted to 1,046,541,000 pounds, valued at $29,254,000; menhaden amounted to 394,776,000 pounds, valued at $893,000; oysters, clams, etc., amounted to 347,799,000 pounds, valued at $18,752,000; lobsters and crabs, 96,225,000 pounds, valued at $3,466,000; whale products, 4,028,000 pounds, valued at $497,000; and sponges, 622,000 pounds, valued at $545,000.

As to individual species, the oyster fishery yields the largest value — $15,713,000, or 29 per cent of the total value; salmon is second in value, yielding $3,347,000, or 6 per cent; cod is third, $2,914,000, or 5 per cent; then follow shad, $2,113,000 (4 per cent); lobster, $1,931,000 (4 per cent); clams, $1,896,000 (4 per cent); squeteague (weakfish), $1,776,000 (3 per cent); halibut, $1,562,000 (3 per cent); haddock, $1,308,000 (2 per cent); German carp, $1,135,000 (2 per cent).

In the order of weight the catches were: menhaden, 394,776,000 pounds; oysters allowing 7 pounds of meat to the bushel, 233,309,000 pounds; herring, 125,050,000 pounds; cod, 110,054,000 pounds; salmon, 90,417,000 pounds; alewives (river herring), 89,978,000 pounds; haddock, 59,987,000 pounds; crabs, 52,913,000 pounds; squeteague, 49,869,000 pounds; German carp, 42,763,000 pounds; lake herring, 41,118,000 pounds; halibut, 34,441,000 pounds; hake, 34,340,000 pounds; mullet, 33,703,000 pounds; pollock, 29,462,000 pounds; shad, 27,641,000; flounders, 23,346,000 pounds; shrimp and prawn, 19,080,000 pounds; catfish, 17,817,000 pounds; buffalo fish, 16,729,000 pounds; pike perch, 15,247,000 pounds; red snapper, 13,498,000 pounds; mackerel, 12,103,000 pounds; lake trout, 12,024,000 pounds; mussels, 8,543,000 pounds; scup, 8,414,000 pounds; suckers, 8,199,000 pounds; yellow perch, 7,898,000; whitefish, 7,708,000 pounds. The above named fishes constitute 97 per cent of the entire catch of the country.

The distribution of the several species of food fish, regarded commercially, is as follows:

Alewives are caught chiefly in Virginia and Maryland; black bass in Florida and Illinois; bluefish in New York and New Jersey; carp in Illinois and Ohio; catfish in Louisiana; cod in Massachusetts and Maine; eels in New York and Massachusetts; flounders in Massachusetts, California and New York; haddock in Massachusetts and Maine; halibut in Washington; herring in Maine; mackerel in Massachusetts; mullet in Florida; pike perch in Ohio; pollock in Massachusetts; salmon in Washington, Oregon and California; sardines in California; sea bass in New Jersey; shad in Virginia, North Carolina, Maryland, New Jersey and Florida; squeteague in New York and North Carolina; whitefish in Michigan; crabs in Virginia and Maryland; lobsters in Maine; oysters in Maryland, Virginia, Connecticut, Louisiana, New Jersey, New York and South Carolina, in the order named.

The Fisheries Bureau divides the country for supervisory and statistical purposes into five «Divisions»: these, with the several amounts of their catch, and percentages of the whole catch for the year 1908, are as follows: Atlantic Coast Division, 1,344,655,000 pounds; 71 per cent. Gulf of Mexico Division 117,723,000 pounds; 6 per cent. Pacific Coast Division, 176,150,000 pounds; 10 per cent. Mississippi River Division, 148,284,000 pounds; 8 per cent. Great Lakes Division, 106,632,000 pounds; 5 per cent.

The relative importance of the fisheries in the several States may be gauged by the values of their individual catches (in 1908) as follows:

Massachusetts, $7,095,000; chiefly cod, haddock and mackerel, with herring, pollock and halibut of less importance.

Virginia, $4,716,000; chiefly oysters, with shad, menhaden, clams and crabs secondary.

New York, $4,594,000; chiefly oysters, with squeteague, bluefish, flounders and clams secondary.

Washington, $3,513,000; chiefly salmon and halibut, with oysters secondary.

Florida, $3,380,000; chiefly mullet and sponges, with red snapper, shad and oysters secondary.

Maryland, $3,306,000; chiefly oysters, with crabs, shad and alewives secondary.

Maine, $3,257,000; lobsters, with cod, herring, haddock and clams secondary.

New Jersey, $3,069,000; chiefly oysters, with squeteague, clams and shad secondary.

Connecticut, $2,982,000; chiefly oysters.

California, $1,970,000; chiefly salmon, with oysters secondary.

North Carolina, $1,776,000; chiefly shad and oysters.

Rhode Island, $1,752,000; chiefly oysters.

Louisiana, $1,569,000; chiefly oysters and shrimp.

Michigan, $1,473,000; chiefly lake trout and herring.

Illinois, $1,436,000; chiefly German carp.

Oregon, $1,356,000; chiefly salmon.

Wisconsin, $1,067,000; chiefly lake trout and herring.

Ohio, $840,000; chiefly lake herring and carp.

Georgia, $701,000; chiefly oysters.

Mississippi, $556,000; chiefly oysters.

Delaware, $541,000; chiefly oysters and menhaden.

Pennyslvania, $513,000; chiefly shad.

Texas, $446,000; chiefly oysters.

Alabama, $387,000; chiefly oysters.

South Carolina, $288,000; chiefly oysters.

Missouri, $271,000; chiefly German carp.

Indiana, $223,000; chiefly mussel products.

Iowa, $215,000; chiefly German carp.

Arkansas, $207,000; chiefly buffalo fish and catfish.

Minnesota, $192,000; chiefly lake herring.

Tennessee, $112,000; chiefly buffalo fish and catfish.

Kentucky, $110,000; chiefly catfish.

New Hampshire, $53,000; chiefly lobsters.

Kansas, $28,000; chiefly German carp.

Nebraska, $22,000; chiefly German carp.

South Dakota, $4,200; chiefly buffalo fish.

West Virginia, $2,000; chiefly carp and catfish.

Oklahoma, $300; chiefly drumfish.

With the object of restoring and maintaining the commercial fisheries of the country, and the stocking of its interior waters, the Bureau of Fisheries has 50 permanent hatcheries and 76 auxiliaries — subhatcheries and egg collecting stations. Nearly all the output of these establishments goes to the original sources from which the eggs were obtained. Besides the eggs, which are distributed mainly to State fishery commissions, young fish are widely distributed to all sections. These young fish are graded as «fry» up to the time the yolk-sac is absorbed and the fish begins to feed; "advanced fry" from the first classification up to the time they are one inch in length; «fingerlings,» from one inch in length up to one year old; «yearlings,» from one year old up to two years. In the fiscal year ended 30 June 1915, the number of eggs distributed was 536,260,143, of which 326,350,000 were pike perch; 98,940,000 whitefish; and 34,466,923 chinook salmon. The number of fry distributed was 3,694,281,699, of which 1,294,156,000 were flounders; 500,730,000 pollock; 405,400,000 whitefish; 282,820,000 pike perch; 260,133,000 cod; 195,267,000 yellow perch; 194,670,000 lobsters and 161,980,000 white perch. Of yearlings, fingerlings and adults, there were distributed 58,215,962. The total distribution of fish and eggs was 4,288,757,804, comprising 44 different species. The widest distribution was of brook trout: 5,700,263 fry and 6,965,167 fingerlings, yearlings and adults were sent to over 2,400 different localities.

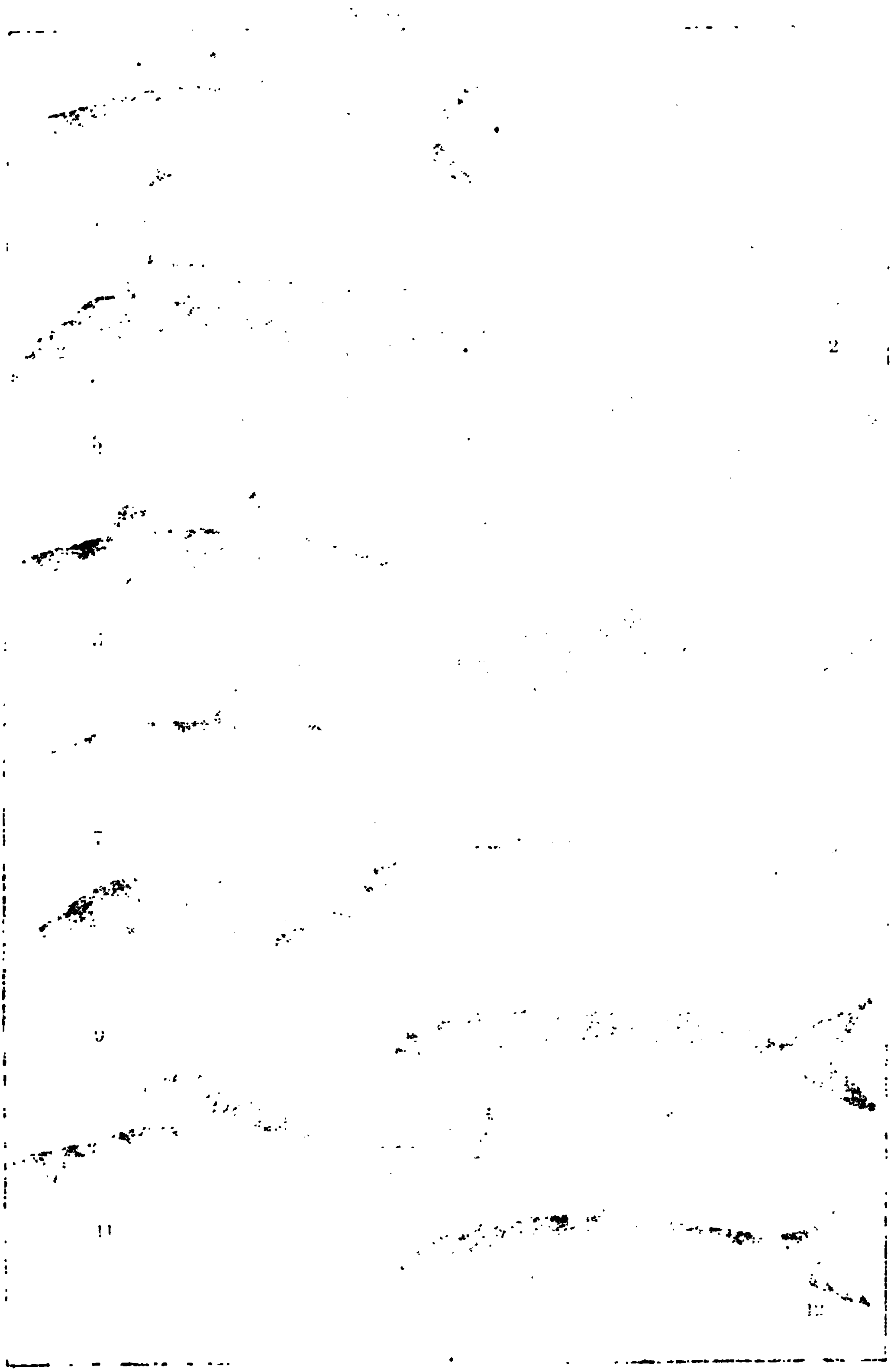
A characteristic feature of the New England fisheries is the employment of a large fleet of fine schooner-rigged vessels in the offshore fisheries for cod, haddock, hake, halibut and mackerel. Cod is the principal fish so taken, part of the catch being made on the Grand Banks and other banks lying off Newfoundland and Nova Scotia; and part on the very extensive and prolific banks adjacent to the New England shore, the most noted of which is Georges Bank. The most important of the New England boat and shore fisheries are those for sea-herring (caught chiefly in brush weirs), lobsters (caught in pots made of laths), soft-shell clams and oysters. In the catch of herring, soft-shell clams and lobsters, Maine surpasses all other States.

The oyster industry of the Middle Atlantic States gives to that region the importance which its fisheries have attained. The principal oyster grounds are in Long Island Sound, Delaware Bay and Chesapeake Bay, a large part of the output now being taken from planted beds. An immense fleet of sailing vessels and boats is engaged in dredging and tonging oysters and running them to market. Other important salt-water products of this section are bluefish, menhaden, sea bass, squeteague, hard clams and crabs. The anadromous fishes, the shad, the alewives and the striped bass, support valuable fisheries. The South Atlantic region has no noteworthy vessel fisheries, but its pound-net, gill-net and seine fisheries for alewives, shad, sea mullet and squeteague are important, shad being the leading product. The most prominent products of the Gulf States are mullet, red snappers, squeteague, oysters, shrimp and sponges.

The Pacific States have very important vessel fisheries addressed to cod, halibut and whales, and very extensive shore fisheries for salmon, herring and oysters. The salmon fishery is the most valuable in the world, immense quantities of quinnat, blue-back, silver and other salmon being caught in the Sacramento and Columbia rivers, in Puget Sound and in Alaska. Much of the yield is canned. Statistics for the Alaska fisheries for 1914 show the total investment for that year at $37,038,632, of which 80 per cent was in the salmon fishery. There were 21,200 persons engaged, of whom 11,178 were white. The product was valued at $21,242,975. The pack of salmon for the season was 4,056,653 cases of 48 pounds each — a total of 294,719,344 pounds. The number of salmon caught was 54,651,915. The other fishery of importance in Alaska is the whale fishery. In 1914, 482 whales were captured by the two shore stations, and about 50 by the 4 whaling vessels in the Arctic. The total value of products was $317,349. From the 5 private salmon hatcheries in Alaska there were liberated in the year ended 30 June 1915, 79,619,500 fry of red varieties of salmon; and from the 2 government hatcheries, 51,163,100 fry. Besides this restocking of the Alaskan waters there are several streams used by salmon in spawning, which are closed by law against fishing. Waste of fish at the canneries is very severely dealt with by the government under the law of 1906.

The fisheries of the Great Lakes are the most important lake fisheries in the world, those in the United States waters producing over 100,000,000 pounds of excellent food fish annually. Lake Michigan has the largest catch, amounting to 41 per cent of the total. Lake Erie yields 34 per cent: Lake Huron, 13 per cent; Lake Superior, 9 per cent; Lake Ontario, 2 per cent. The principal fishes are whitefish, lake herring or cisco, lake trout, pike perch and yellow perch. The numerous interior waters of the country are well supplied with economic animals and support valuable fisheries. The most productive waters are the Mississippi River and tributaries. The species figuring most conspicuously in the catch are black bass, buffalo fish, carp, crappies, suckers, frogs and mussels, the shells of the last named being extensively used in making pearl buttons.

Canning and Preserving.— The 1914 census of manufactures reported 538 establishments in the United States in that year engaged in canning and otherwise preserving fish and oysters, with products amounting to $58,283,404 — an increase of 44.1 per cent since 1909. Canned fish amounted in value to $41,321,593. The largest item was canned salmon, $27,633,284; sardines were second, with $6,238,933; followed by oysters, $2,676,951; shrimp, $1,725,621; tuna, $1,638,675; clams, $670,363; all other canned fish, $737,766. Of smoked and dried fish there were prepared 28,713,806 pounds, valued at $2,759,341. The largest item was



1. [illegible]
5. [illegible] Mackerel.
9. [illegible]

4. Ster[illegible]
8. [illegible]
12. [illegible] fish.

[illegible] much of [illegible] were [illegible] distribution [illegible] fish and eggs [illegible] fry and other [illegible] were sent to over [illegible]

A [illegible] of the New England fisheries [illegible] employment of a large fleet of [illegible] vessels in the offshore fisheries [illegible] Grand [illegible] lying off New [illegible] and part of the [illegible] Banks [illegible] to [illegible] of [illegible] the most important [illegible] fisheries [illegible] (caught [illegible] made [illegible] clams [illegible] In the [illegible] and lobsters, [illegible] other States.

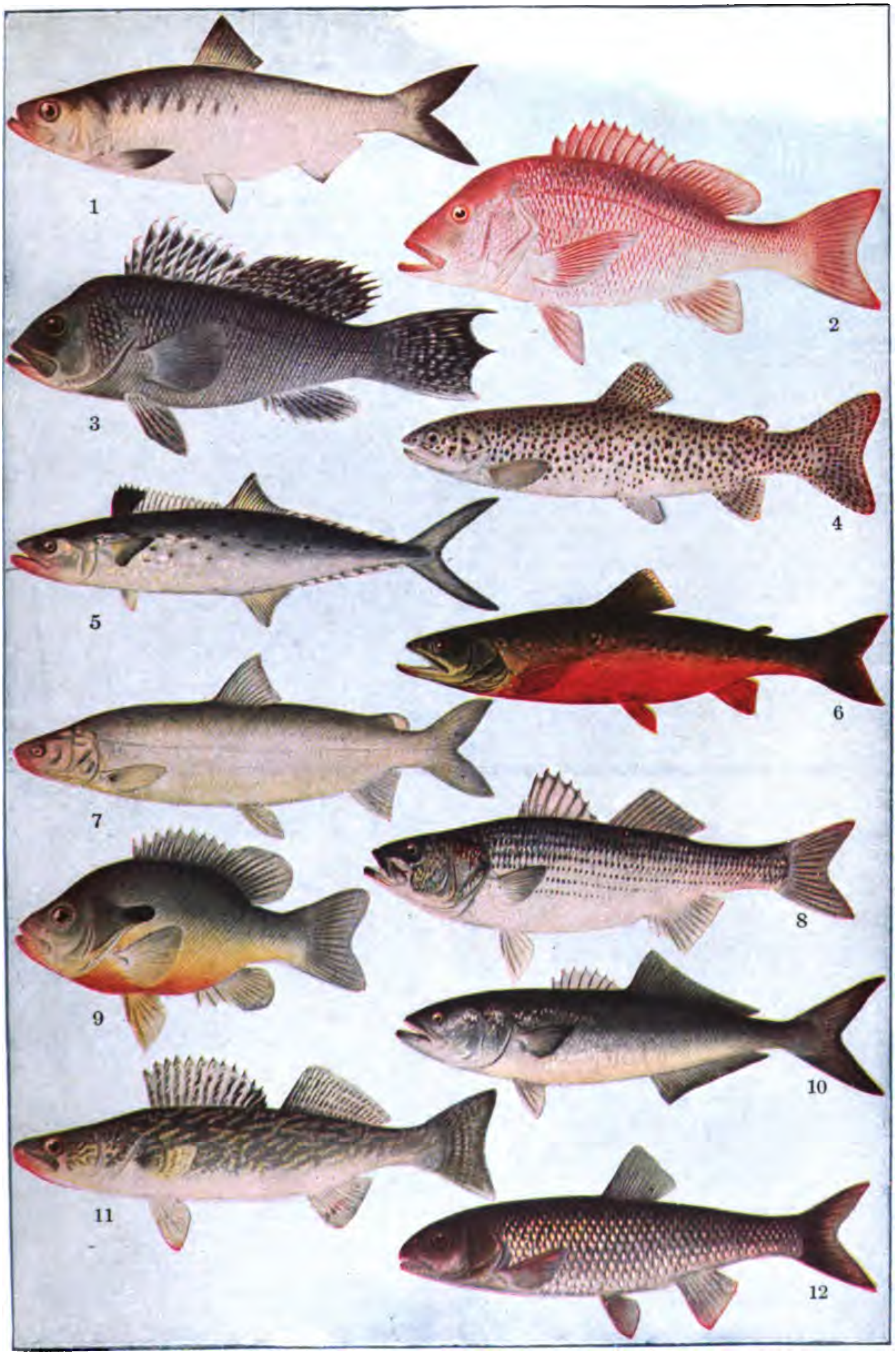
[illegible] Middle Atlantic [illegible] to [illegible] the importance [illegible] The principal [illegible] Long Island Sound [illegible] Bay a large [illegible] taken from [illegible] vessels [illegible] products [illegible] The [illegible] the alewives and [illegible] States [illegible]

The Pacific States have [illegible] salmon [illegible] oysters [illegible] Southeastern Alaska [illegible] were valued at $2,[illegible] of salmon for the [illegible] each [illegible] the whole [illegible] In [illegible] by the [illegible] 50 by the 4 [illegible] in the [illegible] total value of [illegible] the 5 [illegible] salmon [illegible] were [illegible] in the [illegible] 79,[illegible] from the 2 [illegible] fry. Besides [illegible] waters there are several [illegible] mon in spawning, which [illegible] against [illegible] under the law of 190[illegible]

The fisheries of the Great Lakes [illegible] most important lake fisheries in the [illegible] those in the United States [illegible] over [illegible] pounds, of [illegible] amounts. Lake [illegible] has the largest [illegible] amounting to 41 per cent of the total [illegible] Erie [illegible] per cent; Lake Huron [illegible] cent; Lake Superior, 9 per cent; Lake [illegible] 2 [illegible] cent. The principal fishes are the lake herring or [illegible], lake trout, pike [illegible] and yellow perch. The numerous [illegible] waters of the country [illegible] supplied [illegible] commercial [illegible] The most [illegible] waters [illegible] Mississippi River and tributaries. The [illegible] most [illegible] in the [illegible] black bass, buffalo [illegible] crappies, [illegible] is, the [illegible] being extensively used in making [illegible]

Canning and Preserving.—[illegible] census of manufactures [illegible] in the United States [illegible] in canning and otherwise preserving [illegible] oysters, with products amounting to [illegible] Canned [illegible] amounted in value [illegible] The [illegible] was canned [illegible] were [illegible] followed by oysters, $[illegible]051 [illegible] tuna, $1,0[illegible]; clams, $[illegible]; canned fish, $7[illegible]. Of smoked fish there were [illegible] valued at $2,7[illegible]341. The [illegible]

AMERICAN FOOD FISHES



1. **Alewife.** 2. **Red Snapper.** 3. **Black Sea-bass.** 4. **Steel-head.**
5. **Spanish Mackerel.** 6. Rainbow Trout. 7. Whitefish. 8. **Striped Bass.**
9. **Sunfish.** 10. Bluefish 11. Sauger 12. **Fall-fish.**

herring, 11,504,126 pounds, valued at $719,640. Salmon was second, 4,248,896 pounds, valued at $638,975. Finnan haddie was third, 4,095,693 pounds, valued at $327,877. Of salt and pickled fish, there were prepared 156,153,589 pounds, valued at $9,200,162. The largest item was cod, 83,502,295 pounds, valued at $5,661,770. Herring was second, 22,150,974 pounds, valued at $668,838.

United States Insular Possessions.— The fisheries of Hawaii give employment to about 3,600 persons, who employ 967 boats. The value of fishing property is $300,000. The catch comprises 7,250,000 pounds of fish besides other products, mostly eaten fresh and is valued at $700,000. The principal fishes taken are the akule, aku and ulua. The Philippine Islands have valuable fishing resources which are but little developed. The leading fishery is that for pearls and pearl shells in the Sulu Archipelago; from time immemorial the pearls from this region have been famous. No statistics are available. The fisheries of Porto Rico are comparatively unimportant, although capable of development; at present the catch is only for local consumption and is eaten fresh.

Canada.— The fisheries of the Dominion of Canada are very extensive and closely resemble those of the United States. The aggregate yield according to official report, amounted in the year ended 31 March 1914, to $33,207,748, of which sea fisheries contributed $29,472,811. These figures include the value of canned products and hence exceed by several million dollars the actual value of the fisheries proper.

The number of men actually engaged in fishing was 71,776, and there were employed 1,992 vessels and 37,686 boats.

Among the provinces, British Columbia led with a catch valued at $13,891,398; Nova Scotia was second, with $8,297,626; then followed New Brunswick, $4,308,707; Ontario, $2,674,685; Quebec, $1,850,427, and Prince Edward Island, $1,280,447.

The catches of largest value were: salmon, $10,833,713; lobsters, $4,710,062; cod, $3,387,109; herring, $3,173,129; halibut, $2,036,400; mackerel, $1,280,319. In weight of catch, herring led with 248,421,900 pounds; cod was second, with 166,459,900 pounds; salmon, 155,141,100 pounds; lobsters, 51,464,600 pounds; haddock, 40,563,300 pounds. See CANADA — FISHERIES.

Newfoundland.— In proportion to population, the fisheries of this island are more valuable than those of any other country. The hair-seal fisheries employ (1914) 20 steamers, aggregating 12,067 tons, and employ 3,959 men. Their catch was 233,719 seals, weighing 1,200,000 pounds. The «Banks» fisheries employ 105 vessels, of 7,790 tons, and 1,892 men, and their catch was about 140,000,000 pounds. The value of fishery products exported is about $8,000,000, and the value of products consumed locally was estimated at $1,000,000. The leading fish are cod and herring, the cod fishery being more valuable than in any other country.

Great Britain and Ireland.— The fisheries of the British Isles surpass those of any other country of Europe, and are about equal to those of the United States. Besides extensive coast fisheries, there are very important offshore vessel fisheries for cod, haddock, herring and flatfishes; gill-nets being set for herring and beam trawls used for the other species. About 106,500 persons find employment in fishing, of which 39,500 are in England and Wales, 37,400 in Scotland and 28,000 in Ireland. The registered fishing vessels and boats numbered 25,000, of which 3,375 are steamers. In 1910 the value of the catch of Great Britain and Ireland was $58,702,675. Herring constituted the largest item in value, reaching $16,064,040; followed by haddock, $8,798,725; cod, $8,011,855; plaice, $5,198,490; hake, $3,154,805; halibut, $2,266,015; and sole, $2,065,395. In 1911 the weight of fish landed on the shores of the British Isles was nearly 3,000,000,000 pounds, valued at about $57,000,000.

Russia.— This country has vast fishery resources and the annual catch exceeds in value that of any other country of Europe except Great Britain. The ocean fisheries are insignificant, but those of the Caspian Sea and the fresh waters, especially the Ural and Volga rivers, are very highly developed. The herring fisheries of the Caspian Sea, Kamchatka and Saghalen are famous, and millions of pounds are caught annually. The sturgeon fisheries are the most valuable in the world, the caviare product alone for 1911 amounting to 5,300,000 pounds. The roach is so abundant and cheap that it may be considered the national fish; between 200,000,000 and 300,000,000 pounds are taken annually in the Caspian Sea. Other important products are carp, catfish, bream, whitefish, yellow perch and lampreys. The total catch in 1910 was 1,582,228,000 pounds, valued at $49,985,000.

France.— Fisheries of great magnitude are prosecuted in the coast waters of France and by French fishermen in Newfoundland, Iceland and the North Sea. The number of vessel and boat fishermen is about 97,000 and of shore fishermen 62,000; and the value of the products taken was $21,240,000. In the cod fisheries of Newfoundland, Iceland and the North Sea, 44,600,000 kilograms of fish, valued at $3,800,000, were caught; and in the high-sea fisheries 56,300,000 kilograms of herring, mackerel and other fish, valued at $5,600,000, were taken. The principal coast fishery is that for sardines, large quantities of which are canned and sent to all parts of the world; the quantity taken was about 40,200,000 kilograms, worth $2,400,000. Other valuable products are tunny, lobsters, spiny lobsters, crayfish, oysters, mussels and seaweeds. The cultivation of oysters has reached great perfection and upward of 1,000,000,000 oysters, grown in artificial enclosures, are marketed annually.

Norway.— In 1910 more than 120,000 people were employed in the Norwegian fisheries, with a fleet of 183 steamers, 2,407 motor vessels, 3,779 sailing vessels and 7,571 open boats. The principal products are cod, valued at about $6,000,000; herring, valued at $3,250,000; mackerel, $800,000; pollock, $700,000; and sprat, $460,000. The cod fishery is carried on chiefly at the Lofoten Islands, where 35,000 fishermen are engaged. Other important fisheries are the lobster, whale, seal and shark. The total value of the fisheries was $13,151,080. A large part of the catch is exported to other European countries and the United States.

Other European Countries.— Germany has cod and herring fisheries, in the Baltic and North seas, and minor fresh-water fisheries.

Upward of 32,000 persons are reported to be employed, and the catch in 1910 was valued at $8,905,140. The Netherlands have valuable herring fisheries, which yield about $1,478,000. Other valuable products are cod, anchovy and oysters. The total yearly production is valued at $8,500,000. The fisheries of Denmark are valued at about $4,000,000. The fishermen of Belgium catch chiefly herring and cod, the output being about $1,350,000 annually. Portugal has 4,000 vessels and boats, mostly engaged in the sardine and tunny fisheries; the products taken have a value of about $4,182,000. The fisheries of Spain are estimated to be worth $2,500,000, but no definite information regarding them is obtainable. Italy has nearly 100,000 fishermen engaged in the tunny, coral, sponge and general food-fish fisheries. The aggregate value of water products is estimated at $3,500,000 yearly. The Swedish fisheries are valued at about $3,850,000 annually. The principal species sought is the herring; the herring fishery of Bohuslän is famous, employing 7,500 men. Other important products are cod, mackerel, eels, salmon and lobsters. The sea fisheries of Austria-Hungary give employment to about 15,300 persons, and yield about $2,200,000 annually. Greece and Turkey have valuable sponge fisheries.

The total yield of the fisheries of Europe for the year 1910, as reported (May 1914) by the Permanent International Council for the Study of the Sea, was 5,670,221,200 pounds, of which herring constituted 26.48 per cent; cod, 18.5 per cent; haddock, 9 per cent; plaice, 6 per cent; mackerel, 3.09 per cent; sole, 2 per cent; halibut, 2 per cent; eels, 1 per cent.

The total value was about $126,000,000, of which England took $40,971,385; France, $23,525,005; Scotland, $15,853,140; Norway, $13,151,080; Germany, $8,905,140; Netherlands, $8,437,615; Denmark, $3,912,745; Sweden, $3,849,255; Iceland (about), $2,000,000; Ireland, $1,878,150; Russia, $1,347,335; Belgium, $1,347,250.

Statistics kept for the North Sea fisheries, covering an area of 152,473 square miles, show that the average quantity of fish taken in 1910 per square mile was 16,115 pounds. The average total catch per day from North Sea waters was 3,360,000 pounds.

Japan.— The fisheries of Japan are in some respects the most important in the world, and in value rank next to those of the United States and Great Britain. In 1913, the fishing fleet of Japan comprised 133 steamers and 414,834 sailing craft and about 2,500,000 persons were employed in fishing and preparing fishery products. The total catch was valued at $47,532,924. All the coast waters abound in excellent food fishes, mollusks, crustaceans and other products, together with many objects used for ornamental, artistic and other purposes besides for food. The leading products are sardines (of which 500,000,000 pounds are annually caught), herring, bonito, cuttlefish and squid, tai, yellow tail, mackerel, tunny, salmon, cod, whales, coral and algæ. The herring, salmon, cod and other fisheries of Hokkaido, the most northern of the main islands, are very extensive, yielding nearly 1,000,000,000 pounds. The aggregate output of the Japanese fisheries is probably not less than 6,000,000,000 pounds a year, with an estimated value of $30,000,000.

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FISHERIES, Bureau of, a branch of the Department of Commerce, and originally of the Department of Commerce and Labor, before its division into separate bodies, 4 March 1913. Directed by a commissioner, its chief purpose is to foster the national fisheries principally by the propagation of food-fishes and the inspection of commercial fisheries. Situated in 31 States, 32 fish hatcheries and 92 auxiliaries and egg-collecting stations, cooperating with State fisheries commissions, carry on the propagation of food fishes, and also biological research and experiments for the promotion of scientific knowledge concerning fishes and marine animals. The total output of fishes and eggs in a recent year amounted to 3,687,535,911. Applications in the interests of more than 10,000 different bodies of water were received for fish for stocking purposes. The Alaska salmon and fur-seal fisheries have received considerable attention, especially for the development of the territorial fur resources, the annual value of which has reached $370,579. Consult 'Department of Commerce — Annual Reports' (Washington, D. C.).

FISHERIES QUESTION. The provinces of British North America in 1760–76 enjoyed mutual fishing rights on the entire North Atlantic coast, but when the Revolution severed Canada from the rest of the seaboard, Great Britain proposed to deny the United States the right to fish there, on the ground of Canadian opposition. As this meant ruin to a great New England industry, the Canadian waters being the cream of the fishing grounds, John Adams refused to sign the Treaty of Paris (7 Sept. 1783) until the right was granted, though his fellow commissioners would have sacrificed them; and his stubbornness secured their retention. Fishing could still go on; but we could not dry or cure fish on the coast of Newfoundland, or the settled coasts or river-banks of Nova Scotia, the Magdalen Islands or Labrador, except by agreement with the inhabitants. Under these provisions, the energetic American fishermen occupied many excellent fishing stations along the Canada shore, to the envy and dissatisfaction of the British; and when the War of 1812 broke out, the latter seized the opportunity to declare the Treaty of Paris abrogated, and order the Canadian officials to refuse American fishermen access to the grounds. The Americans declared the fishery provisions of the treaty unavoidable. The Treaty of Ghent, of 1814, ignored this question, as it did so much else of vital import, and the subject of the fisheries was left open as an unsettled subject of difference, or, as Henry Clay put it, «as a nest-egg for another war.» Collision and friction arose relative to the inshore fisheries; in 1816, 1817 and 1818 American fishing vessels were seized in the Bay of Fundy. After prolonged negotiations, a treaty was entered into at London which revised the fishery provisions, and under which American rights were curtailed; the United States were to have the right of fishing only in deep sea waters at least three miles from shore, except in certain specified areas off the eastern, western and southern coast of Newfoundland and the Magdalens and Labrador, and the right to dry and cure fish was limited to a small part of the coast of Newfoundland and Labrador. They were, however, to be able to enter bays and harbors for wood or water or for refuge. The three-mile provision proved a bone of contention, Great Britain claiming that the three-mile limit must be measured from the headlands of the «bays,» and she pointed to the maps published at the time of the treaty, with the waters in dispute marked as «bays.» The United States, on the other hand, contended that the «bays» must be confined to small indentations, and that the three marine miles must be measured from a line following the sinuosities of the coast. In 1845 Lord Aberdeen, at that time British Foreign Secretary, offered as a «relaxation» from the full rights of Great Britain to open the Bay of Fundy to American fishermen, and this was done; but the American government declined to accept as a favor what they demanded as a treaty right, and pressed for an extension which the British government, urged thereto by Nova Scotia, refused, and both parties thereupon reverted to the strict letter of their rights. Another question also arose, as to the right of Great Britain to control the fisheries by local laws and regulations. Finally, the Reciprocity Treaty of 1854 abolished all mutual restrictions on deep-sea fishing except for shellfish. The United States abrogated this treaty in 1866, and conditions reverted to those of 1818, but the Treaty of Washington in 1871, to take effect in 1873, revived it again in full down to lat. 39° N. The Canadians, however, asserted that their waters were much the more valuable, and on arbitration provided for in the treaty, they were awarded $5,500,000 in 1877, on a claim of $14,280,000. In 1885 the United States abrogated the reciprocity provision of the treaty of 1871, under pressure from fishing interests, and returned to the 1818 status with its disputed meanings. Our fishing vessels were seized as before and a period of acute tension ensued. In 1887 Congress authorized the President at his discretion to lay an embargo on all Canadian commerce to American ports, which, however, has not been done. In 1888 the Chamberlain-Bayard Treaty arranged these difficulties, but the Senate rejected it; a modus vivendi, however, was reached in the same year. A joint high commission to settle the question met in Washington in 1899, but adjourned without coming to a decision. By a treaty of January 1909 the questions in dispute were referred to The Hague Tribunal, which assembled on 1 June 1910, the award being issued on 7 September. The tribunal of arbitration was chosen from the general list of members of the permanent court at The Hague, Dr. H. Lammasch, professor of international law at the University of Vienna, presiding. George Grey, judge of the United States Circuit Court of Appeals, was the American representative, and Sir Charles Fitzpatrick, chief justice of Canada, represented Great Britain. On the important «headland theory,» the verdict was mainly in accord with the British contention, but no principle applicable to all bays was laid down. On the question of Great Britain's right to regulate the fisheries in dispute, the answer of the tribunal effected a compromise. The abstract right was conceded as in her favor, but she was forced to agree to the appointment of a commission of experts to pass her regulations in order that American fishermen may be protected from unfair and discriminatory legislation. Thus was brought to an end an irritating and vexatious controversy, which for upward of a century had from time to time threatened the peaceful relations existing between Great Britain and the United States. Consult ‹The United States and the North-Eastern Fisheries› (Minneapolis 1887); and Wormwith, W. B., ‹The North Atlantic Coast Fishery Disputes› (in ‹Canada and Its Provinces,› Toronto 1914).

FISHERMEN, The. ‹The Fishermen› (Rubakí), Dmitri Vasilyevitch Grigoróvitch, is a story of life among the peasants of northern Tula, where the broad river Oká flows through a level country to empty into the Volga at Nízhni Nóvgorod. These peasants get their living by fishing. Grigoróvitch, like most Russian writers, concerns himself with types of character. He was doubly an artist. His training as a painter and as the historian of art served him well in depicting the river landscape in every aspect. We see it in all the varying seasons of the year. Many of the pictures are veritable poems. Village life is also described with humor and realism. This is especially notable when some of the peasants visit the annual market, where episodes of traffic and of drunkenness occur. All the persons introduced are muzhiks; there is no introduction of «high life.» The plot is as simple as that of a Greek drama, but it touches the deepest springs of human life: honor and treachery, pure unselfish love and ignoble passion, joy and tragedy. The principal persons are found in the izba of the patriarchal old fisherman, Glyeb Savínitch, whose large family is increased at the beginning of the action by the adoption of a mischievous and surly little boy, Grishka, the illegitimate son of «Uncle Akim,» a distant relative of Glyeb's wife, Anna Savélyevna, a ne'er-do-well, boastful, idle, lazy and improvident, who comes to Glyeb's home to beg shelter and shortly afterward dies there, painfully and pathetically, leaving his «godson» for his relatives to bring up. On the other side of the river lives Uncle Kondráti with his granddaughter, the gentle and charming Dúnya. Glyeb and Kondráti are interestingly contrasted: the one proud, powerful, moody, violent-tempered (generally just and kindly), full of peasant wisdom often expressed in clever proverbs; the other calm, serene, religious and noble — the finest type of the muzhik. The story is a tragedy in humble life but a masterpiece of faithful delineation, touching the human heart. Grigoróvitch, as few other modern writers, succeeds in truthfully contrasting vice and depravity with the nobler virtues of unselfishness and pure love, the ugly traits of human nature with the finer qualities which often exist side by side in the same characters; but he is never pessimistic; in the end some element of good triumphs. 'The Fishermen' was published toward the end of Grigoróvitch's most brilliant and fruitful period, which lasted from 1847 until 1855. An English translation, anonymous, was published in New York in 1917, with a brief foreword by Dr. Angelo S. Rappoport.

NATHAN HASKELL DOLE.

FISHER'S HILL, about 20 miles south of Winchester, Va., between the Massanutten and North Mountains, and with its base washed by a branch of the Shenandoah. This place was the scene of an action, 22 Sept. 1864, between a National force under General Sheridan, and one of Confederates commanded by General Early.

FISHER'S HILL, Battle of. General Early was defeated at the battle of the Opequon, Va., 19 Sept. 1864, and retreated during the night 20 miles up the Shenandoah Valley to Fisher's Hill, two miles south of Strasburg, Va. General Sheridan followed at daylight of the 20th up the Valley pike, General Wilson's cavalry division covering his left and General Averell's division on his right. During the afternoon of the 20th, Wright's Sixth corps and Emory's Nineteenth corps arrived at Cedar Creek, crossed and took position on the heights fronting Strasburg. Crook's Eighth corps halted on the left bank of the creek. On 21 September Sheridan pushed through the town, drove Early's skirmishers to the entrenchments and reconnoitered the position, which, naturally strong, Early had strengthened with works of earth and stone, behind which was Wharton's division on the right, then Gordon's, Pegram's and Ramseur's, with Lomax's division of dismounted cavalry on the extreme left. Fitz Hugh Lee's cavalry was at Millford, 12 miles above Front Royal, guarding Luray Valley and Early's right. Sheridan ordered General Torbert, with Merritt's and Wilson's cavalry divisions, to the Luray Valley to drive out any force of the enemy in that quarter, and cross over from the valley to New Market, and intercept Early's retreat. During the afternoon the Sixth corps, after a serious repulse, succeeded in gaining a commanding position near the Confederate works, which was immediately entrenched and artillery put in position. Early's right was too strongly posted to attack in front, so Sheridan concluded to turn and attack his left. During the night of the 21st Crook crossed Cedar Creek and, hidden in a clump of timber, remained until daylight, when, under cover of woods and ravines, he marched in rear of and beyond the right of the Sixth corps, and was again concealed, while Rickett's division of the Sixth corps was pushed out and confronted the left of Early's infantry, ready to join Crook's left when he should attack. While Rickett's division was threatening in front, Crook marched unobserved into the dense timber on the eastern face of Little North Mountain, until he gained the rear of Early's works when, facing to the left, he marched down the mountain side, at sunset. He was seen by Lomax, artillery was turned upon him, but too late; he struck Lomax's dismounted men in flank and rear, driving them back on Ramseur, who endeavored to change front, but Rickett's division advancing struck Ramseur in the act, joined Crook's left, and the two commands moved along in rear of Early's entrenchments, his men giving way all along the line, abandoning many guns. The swinging movement of Rickett's division on the right was taken up from right to left, and between sunset and darkness Early's entire army was defeated and in disorderly retreat. Early reported next morning to General Lee that the enemy "succeeded in driving back the left of my line which was defended by the cavalry, and throwing a force in the rear of the left of my infantry, when the whole of the troops gave way in a panic and could not be rallied." Early retreated four miles beyond Woodstock and Sheridan pursued him all night, to Woodstock, 12 miles, which was reached at daybreak next morning. The Union loss was 509 killed and wounded. Early reported a loss in infantry and artillery of 240 killed and wounded and 995 missing. The loss in Lomax's cavalry would swell the entire Confederate loss to about 1,400. Consult Lane, J. H., 'The Battle of Fisher's Hill' (in *Southern Historical Society Papers,* Vol. XIX, p. 289, Richmond 1891); Pond, G. E., 'The Shenandoah Valley in 1864' (New York 1883); Sheridan, P. H., 'Personal Memoirs' (2 vols., New York 1888); United States War Department, 'The War of the Rebellion, Official Records' (Ser. I, Vol. XLIII, parts 1 and 2, Washington 1893; Atlas, Washington 1891–95).

E. A. CARMAN.

FISHER'S ISLAND, at the entrance of Long Island Sound, about six miles southeast of New London harbor and only about three miles off the coast of Connecticut. The island, however, belongs to the State of New York; it is a part of Southold township, in Suffolk County, Long Island, N. Y. It is about eight miles long, but its greatest width is only one mile. Its total area is about 4,000 acres. There are many fresh water lakes on it. Its undulating surface is covered with rich soil, though vegetation is not very plentiful. In recent years the island has been developed to a considerable extent as a summer resort. Its permanent population is about 400. The United States government has acquired considerable property on the island which has been named Fort Wright and which has become an important military and naval reservation on the Atlantic Coast. Consult Palmer, H. R., 'Fisher's Island' (in *New England Magazine,* N. S., Vol. XXVIII, p. 567, Boston 1903).

FISHES, Eggs of. See EGG.

FISHES, Geographical Distribution of. The laws governing the distribution of animals are reducible to three very simple propositions. Each species of animal is found in every part of the earth having conditions suitable for its maintenance, unless:

(*a*) Its individuals have been unable to reach this region through barriers of some sort; or,

(*b*) Having reached it, the species is unable to maintain itself, through lack of capacity for adaptation, through severity of competition with other forms, or through destructive conditions of environment; or else,

(*c*) Having entered and maintained itself, it has become so altered in the process of adaptation as to become a species distinct from the original type.

Under the first head, numerous illustrations may be given. The absence of loaches, Nile-fishes (*Mormyrus*) in America and of sun-fishes, suckers and mooneyes in Europe may serve as examples.

Of species under (*b*), those that have crossed the seas and not found lodgment, there is, in the nature of things, no record. Of the existence of multitudes of estrays there is abundant evidence. Now and then one among thousands establishes itself permanently, and by such means a species from another region will be added to the fauna. The rest disappear and leave no trace. A knowledge of the currents of the sea and their influence is essential to any detailed study of the dispersion of fishes.

In the third class, that of species changed in the process of adaptation, most insular forms belong. As a matter of fact, at some time or another almost every species must be in this category, for isolation furnishes the most potent elements in the initiation and intensification of the minor differences which separate related species. It is not the preservation of the most useful features, but of those which actually existed in the ancestral individuals, which distinguished such species. In many cases the persistence of characters rests not on any special usefulness or fitness, but on the fact that individuals possessing these characters have, at one time or another, invaded a certain area and populated it. In other words over and beyond the «Survival of the Fittest,» we have the «Survival of the Existing.» The former element is competitive, producing adaptation to conditions. The latter is non-competitive, maintaining hereditary traits, not necessarily useful in themselves.

Barriers Checking Movement of Fishes.— The limits of the distribution of individual species or genera must be found in some sort of barrier, past or present. The chief barriers which limit marine fishes are the presence of land, the existence of great oceans, the differences of temperature arising from differences in latitude, the nature of the sea-bottom and the direction of oceanic currents. That which is a barrier to one species may be an agent in distribution to another. The common shore-fishes would perish in deep waters almost as surely as on land, while the open Pacific is a broad highway to the albacore or the swordfish.

Again, that which is a barrier to rapid distribution may become an agent in the slow extension of the range of a species. The vast continent of Asia is undoubtedly one of the greatest of barriers to the wide movement of species of fish, yet its long shore-line enables species to creep, as it were, from bay to bay, or from rock to rock; till, in many cases, the same species is found in the Red Sea and in the tide-pools or sand-reaches of Japan, or even in the brooks or coral pools of Tahiti or Samoa. In the North Pacific the presence of a range of half-submerged volcanoes, known as the Aleutain and the Kurile islands, has greatly aided the slow movement of the fishes of the tide-pools and the kelp. To a school of mackerel or of flying fishes such rough islands might form an insuperable barrier.

Temperature the Central Fact.— It has long been recognized that the matter of temperature is the central fact in all problems of geographical distribution. Few species in any group freely cross the frost-line, and except as borne by oceanic currents, few species extend their range far into waters colder than those in which the species is distinctively at home. Knowing the average temperature of the water in a given region, we know in general the types of fishes which must inhabit it. It is the similarity in temperature and physical conditions, not the former absence of barriers, which chiefly explains the analogy of the Japanese fauna to that of the Mediterranean or the Antilles. This fact alone must explain the resemblance of the Arctic and Antarctic faunæ. Like forms lodge in like places.

Ocean Currents.— We may consider again for a moment the movements of the great currents in the Pacific as agencies in the distribution of species.

A great current sets to the eastward, crossing the ocean just south of the tropic of Cancer. It extends between the Gilbert and the Marshall islands and passes on nearly to the coast of Mexico, touching the Galapagos Islands, Clipperton Island, and especially the Revillagigedos. This may account for the number of Polynesian species found on these islands, about which they are freely mixed with immigrants from the mainland of Mexico.

From the Revillagigedos the current moves northward, passing the Hawaiian Islands and thence onward to the Ladrones. The absence in Hawaii of many of the characteristic fishes of the Samoan Islands and the Gilbert Islands is perhaps due to the long detour made by these currents, as the conditions of life in these groups of islands are not very different. Northeast of Hawaii is a great spiral current, moving with the hands of the watch, forming what is called Fleurieu's Whirlpool. This does not reach the coast of California. This fact may account for the almost complete distinction in the shore-fishes of Hawaii and California.

It is, of course, not necessary that the movements of a species in an oceanic current should coincide with the direction of the current. Young fishes, or fresh-water fishes, would be borne along with the water. Those that dwell within floating bodies of seaweed would go whither the waters carry the drifting mass. But free-swimming fishes, as the mackerel or flying-fishes, might as readily choose the reverse direction. To a free-swimming fish, the temperature of the water would be the only consideration. It is thus evident that a current which to certain forms would prove a barrier to distribution, to others would be a mere convenience in movement.

Centres of Distribution.— We may assume in regard to any species, that it has had its origin in or near that region in which it is most abundant and characteristic. Such an assumption must involve a certain percentage of error or of doubt, but in considering the mass of species, it would represent essential truth. In the same fashion, we may regard a genus as being autochthonous or first developed in the region where it shows the greatest range or variety of species. Those regions where the greatest number of genera are thus autochthonous may be regarded as centres of distribution. So far as the marine fishes are concerned, the most important of these centres are found in the Pacific Ocean. First of these in importance is the East Indian Archipelago, with the neighboring shores of India. Next would come the Arctic Pacific and its bounding islands, from Japan to British Columbia. Third in importance in this regard is Australia. Important centres are also found in temperate Japan, in California, the Panama region and in New Zealand, Chile and Patagonia. The fauna of Polynesia is almost entirely derived from the East Indies; and the shore fauna of the Red Sea, the Bay of Bengal and Madagascar, so far as genera are concerned, seems to be not really separable from the Indian fauna generally.

In the Atlantic the chief centre of distribution is the West Indies; the second is the Mediterranean. On the shores to the northward or southward of these regions occasional genera have found their origin. This is true especially of the New England region, the North Sea, the Gulf of Guinea and the coast of Argentina. The fish-fauna of the North Atlantic is derived mainly from the North Pacific, the differences lying mainly in the relative poverty of the North Atlantic. But, in certain groups common to the two regions, the migration must have been in the opposite direction; exceptions that prove the rule.

Realms of Fresh-Water Distribution.— If we consider the fresh-water fishes alone we may divide the land areas of the earth into districts and zones, fairly agreeing with those marked out for mammals and birds. The river-basin, bounded by its water-sheds and the sea at its mouth, shows many resemblances, from the point of view of a fish, to an island considered as the home of a mammal. It is evident that with fishes the differences in latitude outweigh those of continental areas, and a primary division into Old World and New World would not be tenable.

Distribution of Fresh-Water Fishes.—As to their distribution in the streams, the fresh-water fishes may be subdivided as follows:

1. Lowland fishes; as the bowfin, pirate-perch, large-mouthed black bass, sun-fishes and some catfishes.
2. Channel fishes; as the channel catfish, the mooneye, the goldeye, garpike, buffalo fishes and drum.
3. Upland fishes; as many of the darters, shiners and suckers, and the small-mouthed black bass.
4. Mountain fishes; as the brook-trout, and many of the darters and minnows.

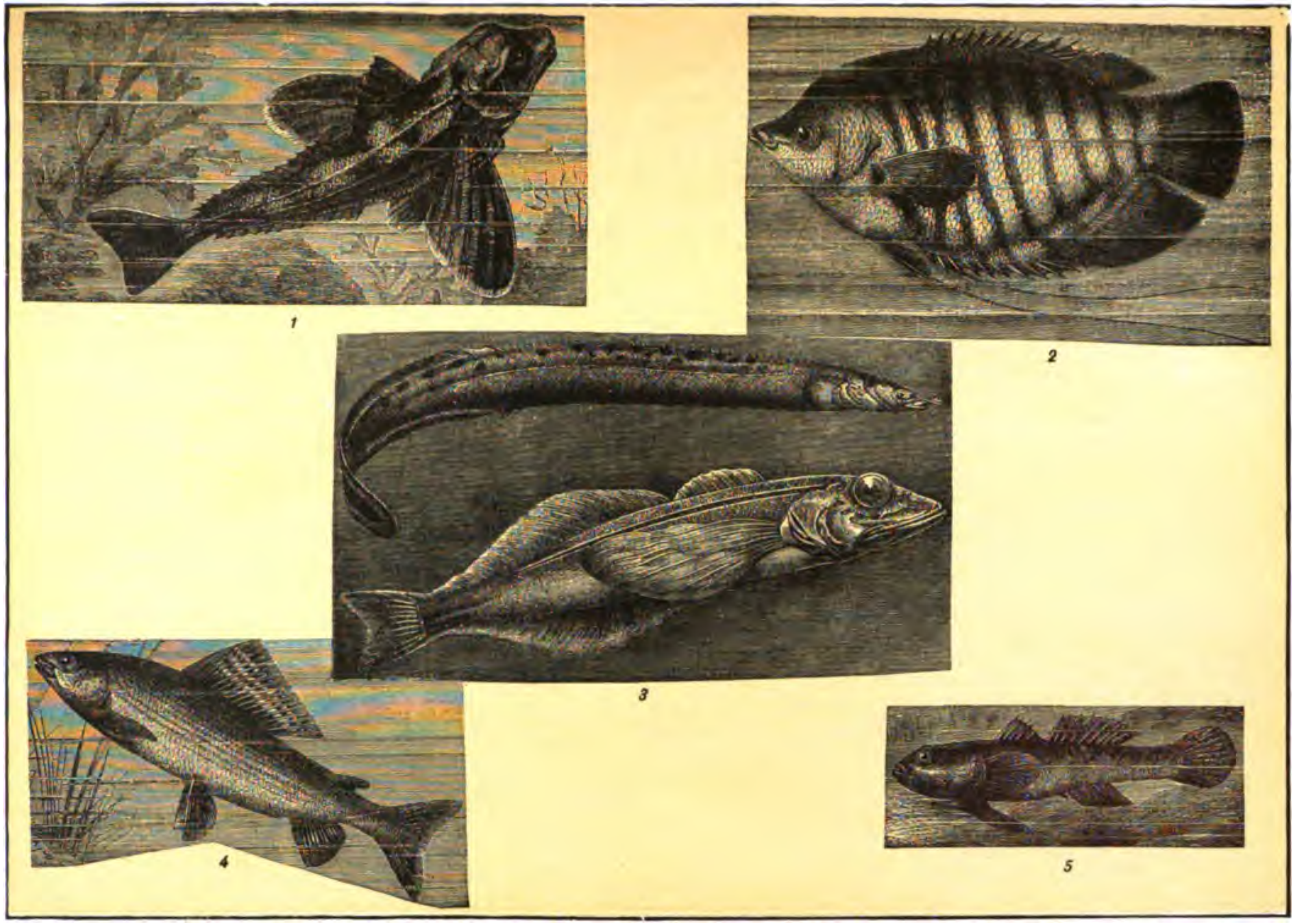
To these we may add, (5) the more or less distinct classes of lake fishes, inhabiting only the waters which are deep, clear and cold, as the various species of whitefish, lake herring, cisco and the Great-Lake trout; (6) anadromous fishes, or those which run up from the sea to spawn in fresh waters, as the salmon, sturgeon, shad and striped bass; (7) catadromous fishes, like the eel, which pass down to spawn in the sea; and (8) brackish-water fishes, which thrive best in the debatable waters of the river-mouths, as most of the sticklebacks and the killifishes.

As regards the range of species, we have every possible gradation from those which seem to be confined to a single river, and are rare even in their restricted habitat, to those which are in a measure cosmopolitan, ranging everywhere in suitable waters.

Barriers to River Fishes.— The existence of boundaries to the range of species implies the existence of barriers to their diffusion. We may now consider these barriers and, in the same connection, the degree to which they may be overcome.

Least important of these are the barriers which may exist within the limits of any single basin, and which tend to prevent a free diffusion through its waters of species inhabiting any portion of it. In streams flowing southward, or across different parallels of latitude, the difference in climate becomes a matter of importance. The distribution of species is governed very largely by the temperature of the water. Each species has its range in this respect — the free-swimming fishes, notably the trout, being most affected by it; the mud-loving or bottom fishes, like the catfishes, least. The latter can reach the cool bottoms in hot weather, or the warm bottoms in cold weather, thus keeping their own temperature more even than that of the surface of the water. Although water communication is perfectly free for most of the length of the Mississippi, there is a material difference between the faunas of the streams in Minnesota and in Louisiana. This difference is caused chiefly by the different temperature occupying the difference in latitude. That a similar difference in longitude, with free water communication, has no appreciable importance, is shown by the almost absolute identity of the fish-faunas of Lake Winnebago and Lake Champlain. While many large fishes range freely up and down the Mississippi, a majority of the species do not do so, and the fauna of the upper Mississippi has more in common with that of the tributaries of Lake Michigan than it has with that of the Red River or the Arkansas. The influence of climate is again shown in the paucity of the fauna of the cold waters of Lake Superior, as compared with that of Lake Michigan. The majority of our species cannot endure the cold. In general, therefore, cold or northern waters contain fewer species than southern waters do, though the number of individuals of any one kind may be greater. This is shown in all waters, fresh or salt. The fisheries of the northern seas are more extensive than those of the tropics. There are more fishes there, but they are far less varied in kind.

But in most streams the difference in latitude is insignificant, and the chief differences in temperature come from differences in elevation, or from the distance of the waters from the colder source. Often the lowland waters are so different in character as to produce a marked change in the quality of their faunas. These lowland waters may form a barrier to the free movements of upland fishes; but that this barrier is not impassable is shown by the identity of the fishes in the streams on the uplands of middle Tennessee with those of the Holston and French Broad. Again, streams of the Ozark Mountains, similar in character to the rivers of East Tennessee, have an essentially similar fish-fauna, although between the Ozarks and the Cumberland Range lies an area of lowland bayous, into which such fishes are never known to penetrate. We can, however, imagine that these upland fishes may be sometimes swept down from one side or the other into the Mississippi, from which they might ascend on the other side. But such transfers certainly do not often happen. This is apparent from the fact that the two faunas are not quite identical, and



1 Gurnard (Trigla hirundo) 2 Gourami (Osphromenus olfax)
3 Indian Spring Eel (Mastacembelus armatus), above; and Golomynka or Oilfish of Lake Bailkal (Comephorus baikalensis), below
4 Grayling (Thymallus thymallus) 5 European Goby (Gobiüs fluviatilis)

in some cases the same species are represented by perceptibly different varieties on one side and the other. The time of commingling of these faunas is perhaps now past, and it may have occurred only when the climate of the intervening regions was colder than at present.

The effects of waterfalls and cascades as barriers to the diffusion of most species is self-evident; but the importance of such obstacles is less, in the course of time, than might be expected. In one way or another very many species have passed these barriers. The falls of the Cumberland limit the range of most of the larger fishes of the river, but the streams above it have their quota of darters and minnows. It is evident that the past history of the stream must enter as a factor into this discussion, but this past history it is not always possible to trace. Dams and artificial waterfalls now check the free movement of many species, especially those of migratory habits; while, conversely, numerous other species have extended their range through the agency of canals.

Every year fishes are swept down the rivers by the winter floods; and in the spring, as the spawning season approaches, almost every species is found working its way up the stream. In some cases, notably that of the quinnat-salmon and the red salmon, the length of these migrations is surprisingly great. To some species rapids and shallows have proved a sufficient barrier, and other kinds have been kept back by unfavorable conditions of various sorts. Streams whose waters are charged with silt or sediment, as the Missouri, Arkansas or Brazos, do not invite fishes; and even the occasional floods of red mud, such as disfigure otherwise clear streams, like the Red River or the Colorado (of Texas), are unfavorable. Extremely unfavorable also is the condition which obtains in many rivers of the Southwest; as for example, the Red River, the Sabine and the Trinity, which are full from bank to bank in winter and spring, and which dwindle to mere rivulets in the autumn droughts.

In general, those streams which have conditions most favorable to fish-life will be found to contain the greatest number of species.

There can be no doubt that the general tendency is for each species to extend its range more and more widely until all localities suitable for its growth are included. The various agencies of dispersal which have existed in the past are still in operation. There is apparently no limit to their action. It is probable that new «colonies» of one species or another may be planted each year in waters not heretofore inhabited by such species. But such colonies become permanent only where the conditions are so favorable that the species can hold its own in the struggle for food and subsistence. That various modifications in the habitat of certain species have been caused by human agencies is of course too well known to need discussion here.

Of watersheds in the United States the most important and most effective is unquestionably that of the main chain of the Rocky Mountains. This is due in part to its great height, still more to its great breadth, and most of all, perhaps, to the fact that (Two Ocean Pass excepted) it is nowhere broken by the passage of a river. In the few cases when species have crossed this barrier, some break in the chain (as the Two Ocean Pass in Wyoming connecting the Snake River with the Yellowstone) has now been recorded.

Habitat of Species.— Each species finds its habitat fitted to its life, and then in turn is forced to adapt itself to this habitat. Any other kind of habitat then appears as a barrier to its distribution. Thus to a fish of the ripples a stretch of still water becomes a barrier. A species adapted to sandy bottoms will seldom force its way through swift waters or among weeds or rocks.

The stream that has the greatest variety of animals in it would be one (1) connected with a large river; (2) in a warm climate; (3) with clear water, and (4) little fluctuation from winter to summer; (5) with little change in the clearness of the water; (6) a gravelly bottom; (7) preferably of limestone, and (8) covered in its quiet reaches and its ripples with water-weeds. These conditions are best realized in the United States in the tributaries of the Ohio, Cumberland, Tennessee and Ozark rivers among American streams, and it is in them that the greatest number of species of fresh-water animals (fishes, crayfishes, mussels, etc.) has been recorded. These streams approach most nearly to the ideal homes for animals of the fresh waters. The streams of Wisconsin, Michigan and the Columbia region have many advantages, but are too cold. Those of Illinois, Iowa, northern Missouri and Kansas are too sluggish, and sometimes run muddy. Those of Texas and California shrink too much in the summer, and are too isolated. The streams of the Atlantic Coast are less isolated, but none connects with a great basin, and those of New England run too cold for the great mass of the species. For similar reasons the fresh-water animal life of Europe is relatively scanty, that of the Danube and Volga being richest. The animal life of the fresh water of South America centres in the Amazon, and that of Africa in the Nile, the Niger and the Kongo. The great rivers of Siberia, like the Yukon in Alaska and the Mackenzie River in British America, have but few species of fresh-water animals, though the kinds fitted for life in cold, clear water exist in great abundance. See FISH; ICHTHYOLOGY. DAVID STARR JORDAN,

Chancellor Emeritus Leland Stanford Junior University.

FISHES, Nest-making by. While the great majority of fishes cast their eggs (spawn) and the fertilizing milt of the males loose in the water, many follow a much less wasteful method, even taking good care of them and of the resulting fry. All who have had experience with aquariums know of this habit in the little sticklebacks, the males of which construct, in crevices of rocks, or among water-weeds, elaborate muff-shaped nests of small sticks and plant-fragments, woven together with glutinous threads spun from an organ connected with the kidneys. In such a nest the female then deposits her few and relatively large eggs, which are zealously watched and brooded by her fierce little mate. This case is nearly paralleled by some of the European gobies; and also by that curiosity of mid-ocean, the Sargasse-fish, which spends most of its life resting upon the floating gulf-weed of the sea. Here it glues together, by means of a pasty secretion from its body, the twigs and leaves of a single plant of the gulfweed (Sargassum) into a sort of bag, within which large numbers of eggs are hung by silky fibres like clusters of grapes. Somewhat similar is the precaution of the gouramis and paradise-fish of Oriental waters, which form a floating raft of bubbles of air and mucus blown from their mouths, in which the eggs are entangled and float about guarded by the male. Another sort of floating nest, composed of bits of weed, is constructed as a raft for its thousand or more eggs by one of the great mormyrs (*Mormyrus*) of the Nile and its tributaries. This is a big, strange-looking, beaked fish related to the pike, and representing a group (*Scyphophori*) venerated by a sect of the ancient Egyptians and depicted on their monuments. Its nests are carefully avoided by the negroes, for the fish will attack anything that approaches its property, and it can bite cruelly.

Most of the nest-builders are fresh-water fish, and represent a variety of groups. The habit is familiar to us, indeed, in the case of our bass and sun-fish. As soon in early summer as the water is suitably warm the male black bass (of both species) betakes himself to the shallow margin of the river or pond, where he lives, where the bottom is sandy, or better, is covered with small pebbles. There he scoops out with nose and fins a saucer-like depression, into the centre of which he pushes a layer of little stones. Having prepared the place to his satisfaction, he searches for a female bass who is «ripe,» as they say — that is, carrying eggs sufficiently matured for extrusion. Others do not attract him; or his attentive addresses may be repulsed. Having discovered a female ready to spawn he appeals to her by such affectionate inducements as fishes understand, and endeavors to lead her to the home he has prepared. She may be reluctant and coy, but he persistently entices her until together they halt above the plate of pebbles, which he now cleans anew by his waving fins. Often he will sidle up to her, and, pressing against her body, will appear to try to assist her in discharging her eggs; and as soon as this discharge begins he supplies the milt that contains the fertilizing element necessary to their development. This done she goes her way without further attention from him. Henceforth his interest is solely in the eggs that have fallen among the pebbles, and he never leaves them for more than a minute or two, fanning them steadily as he poises above the nest, and watching that no big water-beetle, or crayfish, or predatory minnow invades his domain. It is comical to see the fierce anger with which he will dash at any fish that ventures near, and when, as frequently happens, a dozen or so bass are nesting within a yard or two of one another, everyone fearful of his neighbor, vigilance and courage are called for every instant. This care extends to the fry after the eggs hatch, until they have grown somewhat, after which they are more in danger of being eaten by their parent than by anything else. Many other fishes show this fatherly zeal.

Sunfish have similar habits, but they seek places for their nests more sheltered by vegetation, they are less quarrelsome and their tendency to cannibalism is far less.

Some fishes, however, carry this building of pebble-nests to greater perfection. One of these is our common little black-nosed dace (*Rhinichthys atronasus*), which clears a space, puts a layer of stones, then a layer of eggs, then layer of pebbles, and so on until the laying is finished. Both sexes work together, bringing the pebbles in their mouths. In deeper rivers the lamprey eels (Petronyzon) do something similar, and are known as «stone-toters.» A silurid (*Arius*) of Australia makes mounds of alternate layers of stones and eggs; and those brilliant sea-fish, the wrasses, are even more industrious, for a pair, working together, will form a nest of sea-weeds, broken shells, corals, etc., in which their eggs safely hatch. That strange little fish of the rivers of the Mississippi Valley, the bowfin, or grindle (*Amia calva*), which is so interesting as a survivor of a race that almost became extinct in the early ages, digs in the mud of sluggish streams an excavation two or three feet in diameter, and several inches deep, which is garnished all around the edge with bits of plant-roots or perhaps a ridge of sand. This done he awaits the coming of a female, not often seeking one; for some Lady Bowfin presently comes along, and the pair consort for a considerable time, followed by spawning, after which the male guards the eggs that stick in great numbers to the bordering weeds and rootlets. Very similar care is shown by a larger relative in West Africa (*Protopterus*) which removes all the grass from a wide space of bottom, thus made perfectly smooth and walled in by the débris swept out of it. Here the eggs are dropped on the bare mud. «Until the eggs are hatched, which occurs about the eighth day, and while the larvæ are in the nest, the male remains on guard, and is apt to bite severely an incautious intruder. Probably with a view to aërating the eggs, the water is continually lashed about by the tail of the guardian parent.» A fish of Gambia (*Heterotis*) attends to the security of its eggs in the same way. Several kinds of fishes hide their eggs in natural or artificial cavities. Thus some British blennies attach them in a single layer to the sides of cavities in rocks or among stones, where they are watched by the male parent. The little male European sand-goby scoops out the sand from beneath an empty shell, usually that of a scallop, whereupon a female deposits her adhesive eggs on the under surface of the shell and leaves the male on guard. Several kinds of catfish stow away their spawn in crevices of a steep bank, or even dig a burrow into the bank, as is done by our common bullhead. Certain South American silurids even line the excavation with grass or leaves amid which the eggs are hidden. All these deposits are guarded. That this guardianship all over the world is the office of the males alone, whatever the character of the fish, is notable; and also that in all such cases he continually agitates the water about the nest, which is precisely what fish-culturists have found it necessary to do in their troughs and jars, when they attempt to hatch fish-eggs artificially.

Ernest Ingersoll.

FISHGUARD, Wales (Welsh, *Abergwaun*), market town and seaport of Pembrokeshire, near the mouth of the Gwaun. It has an excellent harbor and within recent years transatlantic steamships have made it a port of call to receive and discharge passengers for London and the Continent. The fishing industry is a thriving one. Here in 1797 occurred the so-called "Fishguard Invasion" of the French under General Tate, an Irish-American soldier of fortune. The 1,400 men who disembarked were however quickly gathered in by the local militia. Pop. 2,892.

FISHING. See ANGLING; FISHING TACKLE; FISH AND GAME LAWS.

FISHING BIRDS are those that subsist on fish and whose structure is adapted to enable them to capture fish. Many different forms come under this designation and they cannot be assigned to any single scientific group. Under fishing birds are to be classed the loons, penguins, puffins, auks, frigate-birds, gannets, cormorants, pelicans, herons and a few species of duck. Of these some are powerful swimmers and divers while others are skilful in lying in wait and snatching any fish that comes sufficiently close to them. Of the fishing birds perhaps the most interesting is the cormorant which has been trained by man to fish for him.

FISHING BOUNTIES, governmental aid to the fishing industry in order to keep up the industry, and especially to provide an adequate number of men trained to the sea. Thus statutes of Edward VI compelled the people of England to observe the days of fast and abstinence of the Roman Church although that Church and its doctrines had been proscribed. Under Elizabeth certain duties onerous to the fishing industry were removed, and special bounties were given to whalers in the 18th century. The American Congress offered bounties in order to build up the fishing industry in 1789, 1792, 1797 and 1799. In 1792 bounties to the cod fishers off Newfoundland varied from $1.50 to $2.50 per ton, according to the size of the vessel; five-eighths of the bounty went to the fishermen and three-eighths to the owner. These bounties continued until 1854. Consult 'United States Statutes at Large' (Vol. I, 229 et seq., 260, 533, 692).

FISHING CAT, a wild cat (*Felis viverrina*), native to eastern India and eastward. It is nearly three feet long, and has a tapering tail about a foot in length. It is dark-gray or brown, striped and spotted with darker color; the tail is barred, and the throat and breast are quite white. Though it is a fierce animal and a keen hunter of game, and has been known to carry off infants, it lives largely by catching fish and shellfish.

FISHING EAGLE, a large eagle of the Orient (*Polioaëtus ichthyaëtus*). As the name indicates it subsists by catching fish and in its habits is very similar to the osprey.

FISHING FROG, a fish. See GOOSEFISH.

FISHING LAWS. See GAME LAWS.

FISHING TACKLE, the equipment — rod, line, hooks, flies, etc., with which the angler provides himself for the sport of fishing. So much of the success and enjoyment of this sport depends upon the tackle that the selection of an appropriate and adequate outfit is a matter of considerable moment, especially to a beginner. If possible, the personal advice of an enthusiastic angler should be obtained. Failing this the tyro will have to gain from reading such knowledge as he can, and, in addition, bring into play his coolest judgment. For the prodigious variety of every essential in an outfit, as offered in the shops, is more than enough to bewilder even an experienced devotee of the sport. A few general suggestions may be offered as fundamental guides.

Rods are of two classes: The solid wood rods, and the built-up rods. Of rods made from the solid wood, lancewood and greenheart are the usual materials, and for many purposes, and in the hands of many fishermen, have given satisfaction. One advantage is their comparative cheapness — that is, a good lancewood rod can be bought for the price of an indifferent built-up rod, and of the two is much to be preferred. The built-up rods are made from the outer siliceous layers of the bamboo. These are carefully worked out in strips of triangular section, and six of these are glued together, forming a rod of hexagonal outline. There is a grade of rod made up of eight strips of bamboo. Their one advantage is that the rod so made is almost round, but they lack other qualities of more importance. A well-made six-strip bamboo rod is the best there is for fly-fishing and for most bait-casting. It has a certain springy flexibility which is wanting in the lancewood, although the latter has its place, and the comprehensive sportsman will have both. Steel rods may be noted in passing: in the hands of a few they have found favor, but to the many they lack the qualities which all fishermen have valued most in the bamboo rod. For fly-fishing the favorite rod is from 9 to 10 feet long, weighing from 5½ to 6 ounces. For bait casting, it is 6 feet long, weighing about 6 ounces if of bamboo, and about 7 ounces if of solid wood. The fly rods come generally in three sections, with an extra tip, or in four or five sections for convenient packing in a trunk. The bait-casting rods are usually in two sections, but may be had in shorter lengths.

Lines.— The line universally recommended by practical anglers as the only perfectly satisfactory line is that known as the enameled, waterproof silk line — in its several varieties. The highest grade of this type is the vacuum process line; most expensive of all, but by no means indispensable. Two models are produced: the "level" line, which is of the same diameter throughout; and the "tapered" line, which is fine at both ends and of larger diameter in the middle section. The tapered lines are favored for long casts. These silk lines test from 14 pounds up to 28 pounds breaking point. The two sizes most in use are F for fly-rods, and E for bait-rods.

Reels are of many patterns, and either single action or multiplying. For trout fishing the single action reel is preferred by a vast majority of experienced fishermen. The pattern most in favor is the narrow spool, as light as may be to have substantial strength, and not too stiff in action of the click. It should hold without crowding 30 yards of double tapered line.

Leaders are of plain gut, or stained to render them less visible as a connection between the line and the fly. They are offered in lengths of three, six and nine feet. The six-foot length is commonly used, but for long casting the nine-foot length is favored.

Hooks.— It goes without saying that the hook must be adapted to the size of the fish expected to be caught as well as to the variety, and these considerations are of far greater importance than the specific design. There is this to be said, however, that the eyed hooks are in all cases to be preferred to snelled hooks, unless the latter have been newly snelled — and this cannot be depended upon in the case of purchased flies, which are ready dressed on the hooks. The eyed hooks are of two models, those with the eyes turned up, and those with the eyes turned down. That the difference is not a serious matter is proved by the fact that there are just about as many advocates of one style as of the other. For trout-fishing the size most in use is No. 10. Occasionally some No. 12 will make all the difference between a full creel and an empty one. For bass, the hooks will range considerably larger. Other fish, other hooks: if a definite advance knowledge cannot be had as to the catch to be expected, the only rational procedure is to provide a variety. It is to be noted, however, that the sizes of hooks, as indicated by the numbers, differ with different makers, so that no advice in this respect is to be taken literally.

Flies.— The artificial «fly» is an essential part of the equipment of the sportsman angler. They are supplied by the dealers in two classes: the wet-fly, and the dry-fly; the one to drop below the surface of the water and the other to float on top. Many expert fishermen tie their own flies, matching at the water's edge the insects which are at that time flying above the water. For the million, however, a good grade of ready-made flies will prove wholly satisfactory if properly selected for the fish sought, and the prevailing season, weather and time of day. A list of the most useful flies will include Beaverkill, Black Gnat, Cahill, Coachman, Cowdung, Grizzly King, Professor, Queen of Water and Wickham's Fancy. Most of these come in both classes, for wet-fly or dry-fly fishing. The Coachman is credited with having caught more trout than any other type. For bass the list will include Coachman, Grizzly King and Professor, and add Brown Hackle, Grizzly Hackle, Montreal and Silver Doctor. Suggestions of this kind, however, must be taken tentatively. Next to one's own experience is that of other fishermen on the same water. A waterproof fly box is the best type of container, and in case of accident may easily save its additional cost in the preservation of valued flies. Barring the accident, a fly book of good quality answers every purpose.

Artificial «minnows» in a score of designs, «frogs,» «grasshoppers,» «crickets,» and other imitations of living baits, spoons, spinners, wigglers and wabblers, form another multitudinous class from which selections must be made for the pursuit of angling in particularized lines. The following named books may be advantageously consulted: Camp, S. G., 'Fishing Kits and Equipment' (New York 1910); and 'Fishing with Floating Flies' (New York 1913); Frazer, P. D., 'Fishing Tackle' (New York 1914); Hanks, C. S., 'Camp Kits and Camp Life' (New York 1906); Henshall, J. A., 'Bass, Pike, Perch and Others' (New York 1903); McCarthy, E., 'Familiar Fish: Their Habits and Capture' (New York 1909); Rhead, L., 'American Trout-Stream Insects' (New York 1916).

FISHKILL LANDING, or **FISHKILL-ON-HUDSON**, N. Y., formerly a village in Dutchess County, on the east bank of the Hudson River, the New York Central and Hudson River, and a branch of the New York, New Haven and Hartford railways. It is connected with the West Shore Railroad at Newburg by ferry and with many of the towns and cities along the Hudson River by electric railways. It is about 55 miles north of New York. In 1913 it was combined with the village of Matteawan, becoming a city under the name of Beacon. It was used as a «landing» as early as the times of exploration along the Hudson, and the first settlement was made about the last decade of the 17th century. During the Revolution the New York Provincial Convention met here, and it shares with Newburg and Matteawan the distinction of being the military depot for supplies for the American troops and frequently the headquarters of Washington. When peace was restored, its advantages as a trading post for the settlements on the east side of the Hudson gave it opportunities that caused it to become quite a good-sized village in the early part of the 18th century. In 1783 the Society of the Cincinnati was organized in its immediate vicinity. Its chief manufactures are the Corliss engines, rubber goods, bakers' machinery, hats, woolens, silks, brick and tile. Coal and food products are shipped here in large quantities from New York. Pop. (1910) 3,902. Consult Anon., 'The Fishkill Centennial' (Fishkill Landing 1883); Bailey, H. D. B., 'Local Tales and Historical Sketches' (Fishkill Landing 1874); Brinckerhoff, T. van W., 'Historical Sketch of the Town of Fishkill, etc.' (Fishkill Landing 1866); Hasbrouck, F., 'The History of Dutchess County, New York' (Poughkeepsie 1909); Smith, J. H., 'The History of Dutchess County' (Syracuse 1882); Ver Planck, W. E., 'The Birthplace of the Order of the Cincinnati' (in *New England Magazine*, Vol. XIV, p. 676, Boston 1896).

FISHWAY, a device to enable fish, especially salmon, to ascend a fall. It may consist of a series of steps over which the water descends, turning a fall into a cascade, and sometimes known as a fish ladder; or it may consist of a chute for diminishing the velocity, and assisting the fish to the level above the dam. Consult Atkins, C. G., 'On Fish-Ways' (in United States Commission of Fish and Fisheries, *Reports* for 1872–73, part 2, p. 591, Washington 1874); Bayer, F. von, 'Fishways' (in United States Bureau of Fisheries, *Bulletins*, Vol. XXVIII, Washington 1908); Gehrhardt, P., 'Fischwege' (in 'Handbuch der Ingenieurwissen-schaften,' Section III, Vol. II, part 2, Leipzig 1912).

FISK, Clinton Bowen, American politician: b. Clapp's Corners, now Greigsville, Livingston County, N. Y., 8 Dec. 1828; d. New York, 9 July 1890. Early in life he removed with his parents to Michigan where he grew up and became a successful merchant and banker. As a result of the financial panic of 1857 he lost practically all that he possessed. In 1858 he moved to Saint Louis, Mo., as representative of a large eastern insurance company. Having been an abolitionist for many years he was one of the first to volunteer after Fort Sumter had been fired upon. He served for a number of years and rose from private to brevet brigadier-general of volunteers, holding successively positions as colonel of the 33d Missouri regiment, commander of an infantry division, commander of the district of Southeast Missouri, of the district of Saint Louis, and of the district of North Missouri. In 1865 he was made assistant commissioner in the Freedmen's Bureau for the States of Kentucky and Tennessee with headquarters at Nashville, Tenn., where he founded, in 1866, the Fisk School for Freedmen, which in 1867 was chartered as Fisk University (q.v.), an institution for the education of colored persons of both sexes. On 1 Sept. 1866 he was mustered out of the United States military service and returned to Saint Louis. Soon afterward he accepted an appointment as State commissioner of the South West Pacific Railroad. After a few years he and some of his associates took over the road which was rechartered as the Missouri Pacific and of which he was vice-president until 1877, removing in 1872 to New York. He became a member of the Indian Commission in 1873 and his interest and influence in public affairs steadily increased. He became especially active in the affairs of the Methodist Church. In politics he was a member of the Republican party for many years, but finally left it and joined in 1884 the Prohibition party, running as its candidate for the governorship of New Jersey in 1886, and for the presidency in 1888, receiving about 250,000 votes at the latter occasion. Consult Hopkins, A. A., 'The Life of C. B. Fisk' (New York 1888).

FISK, Fidelia, American missionary: b. Shelburne, Mass., 1816; d. 1864. She was educated at Mount Holyoke College and from 1843 to 1858 served as a missionary of the American Board with the Nestorians. She was the first principal of the Urumiah Women's Seminary. She published 'Recollections of Mary Lyon' (1866). Consult Fisk, D. T., 'A Memoir of Fidelia Fisk: Faith Working by Love' (Boston 1869).

FISK, James, American stock speculator: b. Bennington, Vt., 1834; d. New York, 7 Jan. 1872. His father was a peddler and the son had few chances for educational improvement, but soon displayed considerable mercantile genius. He became a member of the Boston mercantile firm of Jordan & Marsh, drove shrewd bargains with the government during the Civil War; later opened a broker's office in New York, and was employed with one Belden by Daniel Drew (q.v.) as agent in Drew's struggle with Cornelius Vanderbilt for control of the Erie Railway. The Drew-Fisk and Gould-Eldridge interests in concert succeeded in forcing out Vanderbilt and in placing Gould and Fisk in power, the former as president, the latter vice-president and comptroller of the road. The activity of the two in bribery and corruption involved city, State and Federal officials, and at its climax brought about the gold conspiracy of 1869 and the well-known "Black Friday" (24 Sept. 1869), when the efforts of the combination to corner the gold market resulted in financial panic. Fisk was shot after a quarrel, by E. S. Stokes, a business associate. Consult Anon., 'James Fisk, Jr., etc.' (Philadelphia 1872).

FISK, Pliny, American Congregational missionary: b. Shelburne, Mass., 1792; d. 1825. He was graduated at Middlebury College, Vermont, in 1814 and four years later at Andover Seminary. He was appointed agent of the American Board of Commissioners of Foreign Missions. He was sent to Palestine in 1819 and the year of his death joined the mission at Beirut, Syria. He left in manuscript an English-Arabic dictionary which was published some years after his death. Consult Bond, 'Life of Pliny Fisk' (Boston 1828).

FISK UNIVERSITY, coeducational institution in Nashville, Tenn.; founded in 1866 by the American Missionary Association of New York and the Western Freedmen's Aid Commission of Cincinnati, for the education of colored persons. The university early became well known through the efforts made on its behalf by Gen. Clinton B. Fisk, from whom the institution took its name, and from the "jubilee singers," composed of its students, who toured the United States and Great Britain, raising $150,000 for the institution's needs. The university at present comprises normal college, preparatory, music and industrial departments. The attendance in all departments in 1915 was 531. The total value of the university property was about $400,000, and the annual income from all sources about $8,000.

FISKE, Amos Kidder, American editor and author: b. Whitefield, N. H., 12 May 1842. He was graduated at Harvard 1866 and admitted to the bar 1868. He collaborated with George Ticknor Curtis in the 'Life of Daniel Webster' and was a large contributor to the revised edition of the 'American Encyclopædia' (1873–76). He served for 20 years on the editorial staff of the New York *Times,* joining the staff of the *Mail and Express* 1900. Since the beginning of 1903 associate editor and chief editorial writer of the New York *Journal of Commerce and Commercial Bulletin.* His published works are 'Midnight Talks at the Club' (1890); 'Beyond the Bourn' (1891); 'The Jewish Scriptures' (1896); 'The Myths of Israel' (1897); 'The Story of the Philippines' (1898); 'The West Indies' (1899); 'The Modern Bank' (1904); 'The Great Epic of Israel' (1911); 'Honest Business' (1914).

FISKE, Bradley Allen, American naval officer: b. Lyons, N. Y., 13 June 1854. He was appointed a cadet midshipman in the United States navy in 1870 and became lieutenant-commander 30 March 1900. He was made rear-admiral in 1911, and was aid for operations of the navy from 1913 to 1915, when he resigned. He invented a boat detaching and attaching apparatus for warships in 1877; the first electric ammunition used in the navy in 1888; electric gun-training apparatus and electric steering gear the same year; range- and position-finders in 1889; improvements of the range-finder and electric steering gear in 1895; and an electrical apparatus for transmitting the orders of a ship's commander from the deck bridge to the engine room in 1896; a system of turning turrets of warships by electricity, a speed and direction indicator, the naval telescope and mount, the wireless control of moving vessels and a system of launching automobile torpedoes from air craft. The naval telescope sight has been adopted by all navies and is the main cause of the recent great improvement in the accuracy of naval gunnery. He was awarded the Elliott Cresson gold medal by the Franklin Institute (1893) and a gold medal by the United States Naval Institute (1905) for the prize essay 'American Naval Policy.' Author 'Electricity and Electrical Engineering'; 'Electricity in Theory and Practice' (1883), and 'War Time in Manila' (1915).

FISKE, Harrison Grey, American theatrical manager and journalist: b. Harrison, N. Y., 30 July 1861. He was educated at New York University and began his career of journalist on the Jersey City *Argus*, of which he was also dramatic critic. Later he joined the staff of the New York *Star*. He became a contributor to the New York *Dramatic Mirror* in 1879, of which he soon became a stockholder and editor and of which he obtained a controlling interest in the paper. In 1890 he married Minnie Maddern Davey for whom he was afterward manager as also for the Manhattan Company. He is author of the plays 'Hester Crewe'; 'The Privateer,' and 'A White Pink.'

FISKE, John (originally **Edmund Fiske Green**), American historian and philosopher: b. Hartford, Conn., 30 March 1842; d. Gloucester, Mass., 4 July 1901. In 1855 he assumed the name of his maternal great-grandfather, John Fiske, of Middletown, Conn. In 1863 he was graduated from Harvard, in 1865 from the Harvard Law School, in 1864 was admitted to the Suffolk bar, but never entered legal practice. In 1861 he published, in the *National Quarterly Review*, a notable critical article ('Mr. Buckle's Fallacies') on Buckle's 'History of Civilization in England.' From 1869 to 1879 he was at Harvard, first as a brilliant university lecturer in philosophy, and from 1872 as assistant librarian. He lectured again at Harvard from 1895–97. He was also an overseer from 1879 to 1891 and from 1899 to his death. He held honorary degrees from Harvard and from the University of Pennsylvania, and was a member of numerous American and foreign scientific societies. In 1884 he was non-resident professor of American history in Washington University (Saint Louis, Mo.), where for some years he held annual lecture courses. His reputation as a lecturer was considerable also in Great Britain, where he delivered addresses on American history in 1879 at University College, London, and in 1880 at the Royal Institution. His earlier recognition, however, was chiefly as a thinker and writer in evolutionary philosophy, in particular as the foremost expounder to English-speaking students of Herbert Spencer's philosophic system. In this popularization of Spencer, best represented by his 'Outlines of Cosmic Philosophy' (1874), his lucidity won strong approbation from Darwin. From 1879 his attention was turned toward American history, largely through researches made by him in American aboriginal life in connection with a projected work on the Aryans. Thenceforth his philosophic studies took subordinate place, though he wrote in this field occasional volumes of much interest, and in his 'Ideal of God' (1885) and 'Origin of Evil' gave ultimate presentation of his confirmed views on questions of philosophy and religion. In his series of historical writings, forming broadly a continuous account of events from the earliest discoveries to the beginnings of Federal government, he displayed a marked ability for clear and interesting narrative, and infused a particular interest into the adventurous characters and daring deeds of the period of exploration. He fails at times in points of minor accuracy, but in arrangement, judgment, proportion and dramatic interest he exercised a strong influence on the progress of American historical studies in this country. His style here is not inferior to that of his philosophical treatises. He worked with tremendous energy, and, though dying prematurely, had accomplished an impressive amount of literary labor. Among the titles of his other volumes are 'Myths and Mythmakers' (1872); 'The Unseen World' (1876); 'Darwinism and Other Essays' (1879; rev. ed., 1885); 'Excursions of an Evolutionist' (1883); 'The Destiny of Man' (1884); 'American Political Ideas' (1885); 'How the United States became a Nation' (1887); 'The Critical Period of American History' (1888); 'The War of Independence' (1889); 'The Beginnings of New England' (1889); 'Civil Government in the United States' (1890); 'The American Revolution' (1891); 'The Discovery of America' (1892); 'History of the United States for Schools' (1894); 'Edward Livingston Youmans' (1894); 'Old Virginia and Her Neighbors' (1897); 'The Dutch and Quaker Colonies in America' (1899); 'Through Nature to God' (1899); 'A Century of Science' (1899); 'The Mississippi Valley in the Civil War' (1900); 'Life Everlasting' (1901); 'New France and New England' (1902); 'Essays, Literary and Historical' (1902); 'Colonization of the New World' (in 'History of All Nations,' Vol. XXI, Philadelphia 1902); 'Independence of the New World' (Ibid., Vol. XXII, Philadelphia 1902); 'Modern Development in the New World' (Ibid., Vol. XXIII, Philadelphia 1902); 'Unpublished Orations' (Boston 1909). He also wrote an introduction to an English translation of 'A History of English Literature,' by H. A. Taine, to which his name is attached as editor (1872). From 1887 to 1899 he acted as editor of 'Appleton's Cyclopedia of American Biography.' Consult Clark, J. S., 'Life and Letters of John Fiske' (2 vols., Boston 1917); Green, S. S., 'Reminiscences of John Fiske' (Worcester 1902); Hubbard, E., 'John Fiske' (in 'Little Journeys to Homes of Great Scientists,' Vol. XVII, p. 135, East Aurora 1905); Van Rensselaer, M. G., 'Mr. Fiske and the History of New York' (in *North American Review*, Vol. CLXXIII, p. 171, New York 1901).

FISKE, Minnie Maddern, American actress: b. New Orleans, 1865. Her father, Thomas W. Davey, was a theatrical manager and from infancy Minnie spent much of her time about the theatre, appearing in a child's part when three years old. At 12 she was alternately playing leading rôles and old women parts, and at 15 became a star under the name of Minnie Maddern. She played with many stars of the American stage, including John

McCullough, Laura Keene, Barry Sullivan, etc. In 1890 she was married to Harrison Grey Fiske and retired from the stage for five years. She returned to the stage in her husband's play, 'Hester Crewe,' and starred in various plays, scoring noteworthy successes in 'Tess of the D'Urbervilles,' 'Vanity Fair,' etc. In 1901 she opened the Manhattan Theatre, an independent concern, and there produced 'The Unwelcome Mrs. Hatch' and 'Leah Kleschna.' She did much to popularize Ibsen in America, bringing out several of his plays in which she took the leading rôles. Consult Winter, 'The Wallet of Time' (2 vols., New York 1913).

FISKE, Stephen, American journalist and dramatic critic: b. New Brunswick, N. J., 22 Nov. 1840; d. New York, 27 April 1916. He was graduated from Rutgers College in 1862 and was admitted to the New York bar in 1864. Mr. Fiske soon abandoned the law for journalism and became an editorial writer on The New York *Herald,* later accompanying, as correspondent, the Japanese princes, the Prince of Wales, later King Edward, and President Lincoln on their tours. In addition he acted as war correspondent for the *Herald* during the Civil War and also became dramatic critic for that paper, from which he resigned in 1866 to go to England in the yacht *Henrietta* during the Atlantic Ocean race. Following this, Mr. Fiske was with Garibaldi in Rome during the revolution and then returned to London, where he became manager of the Saint James Theatre and the Royal English Opera Company.

On his return to this country Mr. Fiske became manager of the old Fifth Avenue Theatre and during that time introduced Mme. Modjeska and Mary Anderson to the American public. Later he founded the New York *Dramatic Mirror* and became one of the originators of the Actors' Fund. Most recently Mr. Fiske had been dramatic editor of *The Field, Illustrated.* Among his plays were 'Corporal Cartouche'; 'Martin Chuzzlewit,' and 'My Noble Son-in-Law,' while some of his books were 'English Photographs'; 'Holiday Tales,' and 'Offhand Portraits of Prominent New Yorkers' (1884), the latter containing much interesting material originally published in the *Knickerbocker Magazine.*

FISKE, Thomas Scott, American educator: b. New York, 12 May 1865. He was graduated at Columbia University in 1885, where he was successively fellow, assistant, tutor, instructor, adjunct professor and since 1897 professor of mathematics. He served as acting dean of Barnard College in 1899 and since 1902 has been secretary of the College Entrance Examination Board. In 1909–11 he was examiner in mathematics for the New York State Education Department. He wrote 'Theory of Functions of a Complex Variable' (1906; 4th ed., 1907) and is author of mathematical and educational papers and articles in American and foreign periodicals.

FISSILITY, a term used by some as a synonym for fracture cleavage; by others as a synonym for cleavage. See ROCK-CLEAVAGE.

FISSION, fish'ŏn, a term in biology applied to various separation processes, as cell-division of the bacteria and related algæ, and the dividing of chromosonus (see EMBRYOLOGY). When used in reference to hydroids and related animals it means the process of reproduction by germination or budding, in which the offspring arises as a bud from the parent and is then constricted off. See BUDDING.

FISSIROSTRES, fic-ĭ-ros'trēz, one of the four or five tribes or sub-orders into which the insessorial birds were divided by early ornithologists. The term is no longer used, as the group it represented was not a natural one. It contained the nightjars, swifts, trogons and various other more or less related families.

FISSURE, fish'ūr. Any rock fracture or crack is a fissure, but generally the term is applied to fractures of some size. If accompanied by dislocation of the rocks the fissure is termed a fault. The term true fissure vein so frequently used by miners should be applied to a vein formed along a fault. Such a vein is apt to have considerable length and sometimes great depth. As the term is commonly used by mine promoters it really means nothing except that the promoter wants to give the impression that the mine he is trying to sell is on a vein that will go down indefinitely. See FAULT; JOINT; ORE DEPOSITS.

FISSURE. See BRAIN; RECTUM.

FISSURE NEEDLE, a spiral needle for drawing together the gaping lips of wounds. By revolution, the point is made to pierce the lips alternately, carrying its thread or silver wire with it. See SURGERY.

FISTULA, a burrow or tract through the tissues. Usually the term is applied to tracts between cavities lined by mucous membrane or from a cavity to the body surface. The lining tissues of the tract are easily infected or continuously irritated, thus causing granulation tissues, which make it difficult to heal. Fistulæ are formed by suppuration, or by a low grade of infection along the course of a false passage made by foreign bodies or surgical instruments. The most frequent sites are the anus, the rectum, the intestines, the bladder, the vagina and the salivary ducts. Fistula in ano is always secondary to an abscess in the rectum or an abscess in the perirectal tissue. Abscesses here are difficult to heal, owing to constant infection from the fæces and the construction of the parts. Chronic alcoholics, consumptives and otherwise debilitated subjects are particularly liable to these abscesses, and consequently to fistulæ. When the passage is from the bowel to the skin, with openings at both points, it is said to be complete. Blind internal and blind external fistulæ are two other common varieties. The tissues about the anus may be riddled with these tracts. The conversion of the tract into an open wound must be made before a positive cure will result.

FISTULINA. See FUNGI.

FIT, a sudden but temporary seizure of illness or disease, especially one accompanied by convulsive paroxyms. The term is also applied to a passing attack of gout, coughing, fainting, etc. In a borrowed sense it is used of any irregular period of action or inaction.

FITCH, Clyde. See FITCH, WILLIAM CLYDE.

FITCH, Ebenezer, American clergyman: b. Norwick, Conn., 26 Sept. 1756; d. West Bloomfield, N. Y., 21 March 1833. He was graduated at Yale College in 1777, where in 1780 he was appointed tutor, and continued to act as such for several years. In 1790 he was chosen preceptor of the academy in Williamstown, Mass., and when in 1793 it grew into and was incorporated as Williams College, he was elected its first president, which office he filled with ability and success till 1815, when, resigning, he was chosen pastor of the Presbyterian Church in West Bloomfield, N. Y. This charge he held till 1827.

FITCH, John, American inventor: b. East Windsor, Conn., 21 Jan. 1743; d. Bardstown, Ky., 2 July 1798. He had few educational opportunities and at the age of 17 went to sea for a short time. Later he worked as clockmaker, brassfounder and silversmith. At the outbreak of the Revolution he became a gunsmith for the American troops, with whom he wintered at Valley Forge. He next made surveying and trading tours in the West, as a result of which he made a map of the Northwest, and after escaping from captivity among the Indians returned to Pennsylvania, where at Warminster in 1785 he completed his first model of a steamboat; this had wheels at the sides, which were replaced in the following year with paddles or oars. In the face of discouragement and neglect he succeeded in constructing a vessel, 45 feet long and 12 feet beam, with an engine of 12-inch cylinder, which made a successful trial trip on the Delaware, at Philadelphia, 22 Aug. 1787. Larger vessels were built in 1788 and 1790, the latter being run as a passenger boat, at eight miles an hour from Philadelphia to Burlington, Trenton, Chester and Wilmington throughout the summer. Misfortune, however, dogged «poor John Fitch's» steps; his supporters fell away; and in 1793 he went to France to construct a steamboat, only to find his project frustrated by the Revolution there. Considerable discussion has been carried on at various times as to whether Fitch was the original inventor of the steamship or not. It is said that his plans and specifications were deposited with the American consul at L'Orient, who for several months entrusted them to Robert Fulton (q.v.); and the latter's steamboat certainly was in 1817 declared by a committee of the New York legislature to be «in substance the invention patented by John Fitch in 1791.» Penniless and dejected, Fitch worked his passage back to America, where in the summer of 1798 he is said to have committed suicide at Bardstown, Ky. He left, in manuscript, an autobiography, which is owned by the Philadelphia Library Company. His other papers, including his will, correspondence, plans and specifications of his steamboats were acquired by the Smithsonian Institution, but are now in the manuscript division of the Library of Congress, Washington. Consult Bullock, S., 'The «Miracle» of the First Steamboat' (in *Journal of American History,* New Haven 1907); 'Documentary History of the State of New York' (Vol. II, p. 1039, Albany 1849); Dunbar, S., 'A History of Travel in America' (Vol. I, Indianapolis 1915); Fitch, J., 'Description of a New Invented Steamboat' (in *Columbian Magazine,* Vol. I, p. 174, December 1786); Johnson, A. C., 'Memorial to John Fitch' (Washington 1915); Navy League of the United States, 'John Fitch, etc.' (Hartford 1912); Phillips, P. L., 'The Rare Map of the Northwest, 1785, by John Fitch' (Washington 1916); Preble, G. H., 'A Chronological History of the Origin and Development of Steam Navigation, 1543–1882' (Philadelphia 1883); Purdy, T. C., 'Report on Steam Navigation in the United States' (in United States Census Office, 10th Census, Vol. IV, p. 653, Washington 1883); Rumsey, J., 'A Short Treatise on the Application of Steam, etc.' (Philadelphia 1788); Thurston, R. H., 'Growth of the Steam Engine' (New York 1878); Westcott, T., 'Life of John Fitch, Inventor of the Steamboat' (Philadelphia 1857); Whittlesey, C., 'John Fitch' (in 'Library of American Biography,' Jared Sparks, ed., Vol. XVI, Boston 1845).

FITCH, Leroy, American naval officer: b. Indiana, 1835; d. 1875. In 1856 he was graduated at the United States Naval Academy. During the Civil War he served with the Mississippi squadron and was made commander in 1870. He took part in the capture of Fort Donelson and as commander of the *Moose* prevented Morgan's forces from crossing the Ohio River and captured some of his supplies. He defended Johnsonville, Tenn., against the Confederate General Forrest.

FITCH, Ralph, English merchant and voyager of the 16th century. He dealt in Eastern goods, and, excited by the narratives of Drake and other voyagers, persuaded John Newberie and others to join him in an expedition to the East by way of the Mediterranean. The adventurers set sail in January 1583, landed in Syria, went to Aleppo, and traversing Mesopotamia reached Bagdad. From that city they sailed down the Tigris and through the Persian Gulf to Ormus, where they began a profitable traffic. But their success roused the jealousy of other European merchants in those parts, one of whom denounced them as heretics to the Portuguese inquisition. The Englishmen were thrown into prison at Goa, but finally released, and seeing reason to apprehend further injustice, they secretly escaped. After passing through Golconda, they traveled north through the Deccan, and visited successively Burhampoor, Mandoo, Agra, Allahabad, Benares, Patna, Tanda in Bengal, and a country called by Fitch Couche, which appears to be at the foot of the mountains of Bootan. In September 1585 Newberie left to return to England, but was never again heard of. Fitch continued his journey and traveled south to Hoogly and through Orissa, passing by a port called Angeli, which he described as the seat of a great trade. It cannot now be identified. Returning to the Ganges, he saw Serampore and other towns on its lower branches, made an excursion into Tipperah, and took passage in a vessel to Negrais, in Pegu. He visited Malacca, went back to Bengal, shipped for Ceylon, and thence doubling Cape Comorin sailed to Cochim and Goa, and returned to England in 1591, by the same route he had come, after having performed the most extensive journey that had yet been made by any European in India. Fitch's narrative of his travels, which may be found in Hakluyt (Vol. II, pt. 1, pp. 245–271, London 1599), is exceedingly interesting not less for its quaint style than for the mass of information which it contains. Consult Ryley, J. H., 'Ralph Fitch, etc.' (London 1899), which also contains the greater part of his narrative.

FITCH, William Clyde, American playwright and author: b. New York, 2 May 1865; d. 1909. He was graduated at Amherst College 1886. His first play, ‹Beau Brummell,› was brought out by Richard Mansfield in 1890. This was followed by several adaptations from the French and German and a large number of original pieces. He quickly sprang into prominence and was the first American dramatist whose name was sufficiently well known to attract people to the theatre. His work often suffered from carelessness and haste, but it had about it an unmistakable mark of distinction. He wrote many successful plays, among them, ‹Beau Brummell›; ‹The Climbers› (1905); ‹The Way of the World›; ‹The Girl and the Judge›; ‹Barbara Frietchie› (1899); ‹The Moth and the Flame›; ‹The Stubbornness of Geraldine› (1902); ‹The Girl with the Green Eyes› (1902); ‹Her Own Way› (1903); ‹The Woman in the Case› (1904); ‹The Truth› (1906); ‹The Straight Road› (1906); ‹The City› (1909). He is also the author of ‹The Knighting of the Twins, and Ten Other Tales› (1891); ‹Some Correspondence and Six Conversations› (1896); ‹A Wave of Life,› a novel. See Truth, The. Consult Moses, M. J., ‹The American Dramatist› (Boston 1911), and Winter W., ‹The Wallet of Time› (2 vols., New York 1913).

FITCHBURG, Mass., city, one of the county-seats of Worcester County, on the New York, New Haven and Hartford and the Boston and Maine railroads, 50 miles northwest of Boston. It comprises the villages of Traskville, Rockville, South Fitchburg, West Fitchburg and Cleghorn. It contains a public library, high school, State normal school, large musical library, Burbank Hospital, an old ladies' home, a home for working women, a children's home, electric street railroad, electric lights, several national and savings banks, and a number of daily and weekly newspapers. The various industries employ about 5,000 people. There are manufactories of pianofortes, tools, machinery, paper, saws, electrical apparatus, turned-wood novelties, axle grease, boilers, lining metals, castings, pumps, steam-engines, bicycles, firearms, cotton and woolen goods, etc. The United States census of manufactures for 1914 showed within the city limits 137 industrial establishments of factory grade, employing 9,570 persons; 8,837 being wage earners receiving annually a total of $4,815,000 in wages. The capital invested aggregated $24,881,000, and the year's output was valued at $23,983,000: of this, $7,886,000 was the value added by manufacture. Fitchburg was settled in 1719, but formed a part of Lunenburg until 1764, when it was incorporated. It was chartered as a city in 1872. The government is administered, under the original city charter, by an annually elected mayor. Fitchburg owns its waterworks. Pop. 40,507. Consult Torrey, ‹History of Worcester County› (Philadelphia 1889).

FITCHÉ, or **FITCHÉE,** fi-chā, in heraldry, pointed, like a dagger; sharpened at the lower part. Fitché is usually applied to crosses to indicate that they taper from the centre downward, or fitché at the foot, when the tapering commences only at the bottom of the cross. See Heraldry.

FITCHEW. See Polecat.

FITGER, fit'gėr, **Arthur Heinrich Wilhelm,** German poet and painter: b. Delmenhorst, Oldenburg, 4 Oct. 1840; d. 1909. He was a pupil of Cornelius and Genelti at the Munich Academy; later he studied at Antwerp, Paris and Rome, and in 1869 established his studio in Bremen. As a painter he is known for his large decorative works. He has painted several important friezes and other decorations at Bremen and Hamburg. He wrote several successful dramas: ‹Adalbert of Bremen› (1873), with the afterpiece ‹Here Empire! Here Rome!› (1875); ‹The Witch› (1878); ‹The Roses of Tyburn› (1888). Besides these he is the author of a short epic, ‹Roland and the Rose› (1871); and two volumes of collected poems, ‹Traveling Folks› (1875), and ‹Winter Nights› (1881).

FITTING, fit'ĭng, **Heinrich Hermann,** German jurist: b. Manchenheim 1831. He received his education at Würzburg, Heidelberg and Erlangen and in 1857 became professor of Roman law at the University of Basel. Five years later he removed to Halle in a similar capacity. He retired in 1902. He published the *Archiv für die civilistische Praxis* from 1864 to 1878 and is the author of ‹Der Reichscivilprozess› (7th ed., 1890); ‹Das Reichsconcursrecht und Koncursverfahren› (latest ed., 1904); ‹Die Anfänge der Rechtsschule zu Bologna› (1888).

FITZ (old French for *fils*, son), a syllable frequently forming a prefix in English surnames (Fitz-Herbert, Fitz-Clarence, Fitz-James), like the Scottish Mac, and the Irish O'. Latterly *Fitz* usually denoted illegitimate descent, especially from English kings or princes of the royal blood. There are several noble families of such origin, who include their royal progenitors in their genealogical tables.

FITZALAN, Henry, 12th Earl of Arundel, English statesman: b. about 1511; d. 1580. Henry VIII was his godfather and patron. In 1544 he was made Lord Chamberlain and held this position also under Edward VI. He was removed at the instigation of Warwick in 1550. He was implicated in several of the plots of the time, but his fidelity to Mary was rewarded by his being made her Lord Steward. Under Elizabeth he became Lord High Constable but resigned in 1564. He was discovered plotting in behalf of Mary of Scotland, but escaped arrest until 1571 when he was imprisoned for one year. He was at length released and spent his last years in seclusion. Consult article by Nichols in the *Gentleman's Magazine* for 1833.

FITZALAN, Richard, Earl of Arundel and Warenne, English soldier: b. about 1307; d. 1376. He succeeded to the title in 1331 and six years later was made joint commander against Scotland and later placed in sole command. In 1340 he was created admiral by Parliament. He was present at Sluis and at the siege of Tournai. He commanded a division at the battle of Crécy and was afterward sent on diplomatic missions to Scotland and France. In 1355 he was regent of England. Little is known of his later years.

FITZALAN, Richard, Earl of Arundel and Surrey, English admiral: b. 1346; d. 1397. He succeeded his father in 1376, took a prominent part at the coronation of Richard II and in 1380 was appointed commissioner to regulate the royal household. He was also made admiral of the West and won a signal victory over the French off Margate in 1387. He became a leader of the barons in their opposition to Richard, and in 1387 the king retaliated by having his judges declare Arundel's commission illegal. In the following year he returned with much booty from La Rochelle. He quarreled with John of Gaunt and joined his brother, the archbishop of Gloucester and Warwick, in a conspiracy against the king. After discovery, Arundel surrendered, was condemned and executed.

FITZALAN, Thomas, EARL OF ARUNDEL, English soldier: b. 1381; d. 1415. After his father's death in 1397 he was placed under the guardianship of the Duke of Exeter, by whom he was brutally treated. He effected his escape, joined his uncle, the archbishop, and allied himself with Henry of Derby. Fitzalan regained his estates and titles and opposed Owen Glendower for several years. In 1405 he entered Wales in the company of the king. He was appointed treasurer, constable of Dover and guardian of the Cinque Ports. He died at Harfleur.

FITZBALL, Edward, English dramatist: b. Burwell, Cambridgeshire, 1792; d. 1873. His name was originally Ball, but he substituted the present form in 1819. He made his first dramatic success with 'The Innkeeper of Abbeville' (1820). This was succeeded by a dramatization of 'The Fortunes of Nigel' (1822); and 'Joan of Arc,' and he soon became a prolific dramatist, turning out plays to order in great number, and some of them having enormous success. Among his works are adaptations of Scott's 'Peveril of the Peak' (1823) and 'Waverley' (1824); 'The Pilot' (1825); 'The Flying Dutchman' (1828); 'Jonathan Bradford' (1838) (400 nights); 'Walter Tyrrell' (1835); 'Zazezizozu' (1836); 'The Momentous Question'; 'The Miller of Derwentwater'; and libretti for several of Balfe's, Donizetti's, Bishop's and Wallace's operas, and of the popular song 'The Bloom is on the Rye.' He was the author of 'Thirty-five Years of a Dramatic Author's Life.'

FITZGERALD, fits-jĕr'ald, **Desmond,** American civil engineer: b. Nassau, Bahama Islands, 20 May 1846. He was educated at Phillips Academy, Andover, Mass., and was for 40 years in practice as hydraulic engineer, principally in connection with the Boston water-supply system. He was department engineer of the Metropolitan Water Board of Boston; chairman of the Topographical Survey Commission of Massachusetts; chairman of the Brookline Park Commission and consulting engineer of the water supply and sewage systems of Manila, P. I. He is past president of the American Society of Civil Engineers. He published 'History of the Boston Water Works from 1868 to 1876' (1876) and 'A Short Description of the Boston Water Works' (1895).

FITZGERALD, Edward, LORD, Irish patriot: b. near Dublin, Ireland, 15 Oct. 1763; d. 4 June 1798. He was a son of the first Duke of Leinster. He distinguished himself for intrepidity as aide-de-camp to Lord Rawdon in the American Revolution, and was severely wounded in the battle of Eutaw Springs. He was fond of the woodsman's life and made a journey from Fredericton to Quebec, was admitted at Detroit a member of the Bear Tribe and went down the Mississippi to New Orleans (1790). When the French Revolution broke out he supported its principles and in 1793 hastened to Paris. Here he married Pamela, the reputed daughter of Louis Philippe, Duke of Orleans, and Madame de Genlis, but in reality the daughter of Brisey, a French captain, and Mary Sims, and a native of Fogo Island, Newfoundland. On his return to Ireland, Fitzgerald was desirous of effecting a separation of that country from England and induced the French Directory to furnish him with a fleet and troops. A landing was attempted on several occasions, but without success, and Fitzgerald was seized, tried and condemned to death. He died of his wounds before the time fixed for his execution, 1798. His wife married a second time, Mr. Pitcairn, the American consul at Hamburg, from whom, however, she separated soon afterward. Consult 'Lives' by Moore (2d ed., 1875) and Taylor (1904); Campbell, 'Edward and Pamela Fitzgerald' (1904).

FITZGERALD, Edward, English poet and translator: b. near Woodbridge, Suffolk, 31 March 1809; d. Merton, Norfolk, 14 June 1883. At 17 he entered Trinity College, Cambridge, where he graduated in 1830. At school and college he formed several lifelong friendships with men who afterward became celebrated in different spheres, among them being Spedding and Thackeray. At a later period he gained the friendship of Tennyson and Carlyle. His life was passed quietly — almost in retirement — in various parts of Suffolk, first at Bredfield, his birthplace, then near Ipswich, where he contracted friendships with George Crabbe, the son of his favorite English poet, and Bernard Barton, the Quaker poet; and lastly at Boulge Hall and Woodbridge. Books were his chief indoor recreation; out of doors he occupied himself at first chiefly with boating and afterward with his garden. He married in November 1856 Lucy Barton, daughter of the Quaker poet; but it was an ill-assorted union, and they soon separated. While a man of large and generous impulses he had no liking for the conventional usages of society. Fitzgerald's works are not numerous, by far the most important being his celebrated translation of the 'Rubaiyát' (or quatrains) of the Persian semi-pessimistic astronomer-poet, Omar Khayyám. His first translation from the Persian appeared in 1856, an edition of Jáme's 'Salámán and Absál.' Three years later his *magnum opus* fell on an unregarding public. Declined by *Fraser's Magazine* in 1858, it was originally published at 5s. and had been relegated to the «penny box» when in 1860 it was discovered by Dante Gabriel Rossetti, who was soon joined by Swinburne in appreciation of the poem. Even so, it was nine years before a second edition was called for. Fitzgerald took great liberties with his original, picked and chose his material and strove rather to express the atmosphere than to give a faithful translation. In the result, he has rendered both poet and translator immortal. Edition after edition has fallen from the press and it would be impossible to overpraise it as a work of literary art. «Delightful picture follows delightful picture; thoughts that have occupied the world's greatest thinkers in all ages are clothed in the finest language; the perfect word falls into the precise place; everything is compact, polished, subtle and magnificent.» Other works by Fitzgerald are 'Euphranor: a Dialogue on Youth' (1851); 'Polonius: a Collection of Wise Saws and Modern Instances' (1852); both of which appeared anonymously; 'Six Dramas of Cálderon, freely translated by Edward Fitzgerald' (1853); and translations of Æschylus' 'Agamemnon' and the 'Œdipus' plays of Sophocles. Tennyson's poem 'Tiresias,' was dedicated to Fitzgerald. Consult 'Letters and Literary Remains of Edward Fitzgerald,' edited by W. Aldis Wright (1889; new ed., 1894); 'Life,' by Thomas Wright (1904); 'Variorum Edition of the Poetical and Prose Writings of Fitzgerald,' edited by Bentham (1902–03); and 'Edward Fitzgerald,' by A. C. Benson, in 'English Men of Letters,' series (1905).

FITZGERALD, James Newbury, American Methodist bishop: b. Newark, N. J., 27 July 1837; d. Hong Kong, China, 3 April 1907. He studied law and was admitted to the New Jersey bar in 1858, but in 1862 entered the Methodist ministry. He was recording secretary of the missionary society of his denomination 1880–88 and was appointed bishop in 1888. In 1895 he made the episcopal visitation of the South American and European conferences. For many years he was a trustee of Drew Theological Seminary and vice-president of the board. In 1897–1907 he was president of the Ocean Grove Camp Meeting Association, a position which conferred upon him the duties and powers of mayor of a prominent summer resort, famous as a centre of religious and musical activities. He died at Hongkong, on an episcopal visitation to the Oriental mission conferences.

FITZ-GERALD, John Driscoll, II, American Hispanic scholar: b. Newark, N. J., 2 May 1873. He was graduated at Columbia University in 1895. He studied Romance philology at Berlin, Paris and Madrid. From 1898 to 1902 he was assistant, in 1902–07 tutor, 1907–09 instructor in Romance languages and literatures at Columbia University. From 1909 to 1915 he was assistant professor of Romance languages and literatures and since 1915 has been professor of Spanish at the University of Illinois. He is corresponding member of the Real Academia Española de la Lengua. In 1914 he was sent to South America by the American Association for International Conciliation. He edited 'La vida de Santo Domingo de Silos, par Gonzalo de Berceo' (1904); Lope de Vega, 'Novelas à la Señora Marcia Leonarda' (1913). He is associate editor of the *Romanic Review* and has written 'Versification of the Cuaderna Via as found in Berceo's Vida di Santo Domingo de Silos' (1905); 'Rambles in Spain' (1910), and articles in encyclopedies, periodicals, etc.

FITZGERALD, John Francis, American public official: b. Boston, Mass., 11 Feb. 1863. He was educated in the Eliot Grammar School and the Boston Latin School and took a short course at Harvard. He is principal owner of the weekly journal called the *Republic;* was elected a member of the Boston common council in 1892 and in 1893–94 was a member of the State senate of Massachusetts. He was elected to the 54th, 55th and 56th Congresses (1895–1901), and in 1906–07 served as mayor of Boston. He was re-elected to this office in 1910, serving until 1 Jan. 1914.

FITZGERALD, Oscar Penn, American Methodist bishop: b. Caswell County, N. C., 24 Aug. 1829; d. 1911. He was ordained a Methodist minister in Georgia 1853, went to California 1855 and became editor of the *Pacific Methodist and Christian Spectator,* serving as State superintendent of public instruction in California 1867–71 and being appointed editor of the Nashville *Christian Advocate* 1878. He was made a bishop of the Methodist Episcopal Church, South, 1890. His works include 'California Sketches'; 'Christian Growth'; 'Glimpses of Truth'; 'A Life Study'; 'Century Cameos'; 'Bible Nights'; 'Eminent Methodists'; 'The Whetstone'; 'The Epworth Book'; 'The Menagerie'; 'Judge Longstreet'; 'Sunset Views' (1900); 'The Day and the Word' (1898); 'Sunset Views' (1900); 'Upper Room Meditations' (1903); 'Fifty Years' Observations, Opinions, Experiences' (1903). He was also the author of a series of sketches of early Methodists, etc.

FITZGERALD, Percy Hetherington, Irish novelist and miscellaneous writer: b. Fane Valley, South Ireland, 1834. Educated at Trinity College, Dublin, and was called to the Irish bar in 1855. He has produced some 200 volumes, including fiction, travel, biographies, essays and books of devotion. He has also shown talent as a sculptor.

FITZGERALD, Ga., city and county-seat of Ben Hill County, 70 miles southeast of Macon, on the Atlanta, Birmingham and Atlantic, the Seaboard Air Line and other railroads. It has cotton compresses, cotton mills, oil mills, railroad shops, etc. Lumber and turpentine are important articles of commerce. The city owns the electric-lighting plant and the waterworks. Pop. 5,795.

FITZGIBBON, Mary Agnes, Canadian author: b. Belleville, Ontario, 1851; d. 1915. She was educated in Belleville and at Pinehurst Academy, Toronto. She founded the Women's Canadian Historical Society in 1894 and in 1905 took part in founding the Female Immigrants' Receiving Home in Toronto. She published 'A Trip to Manitoba, or, Roughing It on the Line' (1880); 'Home Work' (1887); 'A Veteran of 1812' (1895; 2d ed., 1898); 'Historic Days' (1898); 'A Trip to Niagara' (1909); 'The Cabot Calendar, 1497–1897,' with Sara Mickle (1898),

FITZGIBBON, Mary Irene, American philanthropist: b. London, England, 12 May 1823; d. New York, 14 Aug. 1896. She removed to New York early in life; entered the community of the Sisters of Charity at Mount Saint Vincent in January 1850 where she was known from then on as Sister Mary Irene, and became sister superior of Saint Peter's School, Barclay street, New York in 1856. In 1869 Archbishop (later Cardinal) McCloskey requested her to organize a home for the care of the waifs of the diocese. On 11 Oct. 1869 the New York Foundling Hospital was opened and within a month was caring for 45 children. During the same year the legislature authorized the city to grant the asylum a site and to appropriate $100,000 toward a building, providing an equal amount should be provided by subscriptions. This amount was soon raised. At the time of Sister Irene's death, the buildings of the asylum covered an entire block and were valued at over $1,000,000. Aside from having full charge of this institution from its inception, Sister Irene raised $350,000 with which she founded the Seton Hospital for Incurables at Spuyten Duyvil.

FITZHERBERT, Sir Anthony, English jurist: b. Norbury, Derbyshire, 1470; d. 1538. He was educated at Oxford, was called to the bar and in 1523 was appointed justice of the Court of Common Pleas. He signed the impeachment of Cardinal Wolsey in 1529 and presided at the trial of John Fisher and Sir Thomas More. He had a high reputation for integrity and his legal learning is attested by his works. He is the author of 'La Graunde Abridgement,' a digest of cases written in Old French (1514); 'The Office and Authority of Justices of the Peace' (1538, 1794); 'New Natura Brevium' (1534; last ed., 1794). To him are attributed the 'Book of Husbandry' (1523) and 'The Book of Surveying' (1523), but these are in all likelihood the work of another.

FITZHERBERT, Maria Anne (Smythe), morganatic wife of King George IV of England; b. Brambridge, England, 26 July 1756; d. Brighton, England, 27 March 1837. Her first husband was Edward Weld, to whom she was married in 1775. He died within a year and she was married to Thomas Fitzherbert 1778. He died in 1781 and she was married to the Prince of Wales 21 Dec. 1785. The marriage was never either publicly avowed or disavowed by George, but it was known to both that the Marriage Act of 1772 invalidated any marriage contracted by a member of the royal family under 25 years of age without the king's consent. Mrs. Fitzherbert was a Roman Catholic and by the Act of Settlement, if the heir apparent married a Roman Catholic, he forfeited his right of succession. There was a general understanding that a marriage had taken place, however, and she was received by the best society and by members of the royal family and was treated by Prince George as his wife. Some time before his marriage to Caroline he ceased for a time to live with her, but in 1800 the connection was resumed and continued until 1803, when it was finally terminated at her desire because of his attentions to Lady Hertford. William IV offered to make her a duchess and allowed her to use the royal livery. Consult Wilkins' 'Mrs. Fitzherbert and George IV' (London 1905).

FITZ-HUGH, Thomas, American educator: b. Longwood, Goochland County, Va., 12 Oct. 1862. He was graduated at the University of Virginia in 1883 and made postgraduate studies in classical philology at Rome and Pompeii and at the University of Berlin. In 1883–84 he was professor of Latin at Central University, Kentucky, professor at the University of Texas from 1889 to 1899 and since 1899 professor of Latin at the University of Virginia. He published 'The Philosophy of the Humanities' (1897); 'Outlines of a System of Classical Pedagogy' (1900); Bulletins of the School of Latin, University of Virginia, and contributions to philological journals.

FITZ-JOHN PORTER CASE, The. See Porter, Fitz-John.

FITZMAURICE, Sir Maurice, English civil engineer: b. 11 May 1861. He was educated at Trinity College, Dublin, was apprenticed to the late Sir Benjamin Baker. He was engineer of the Rotherhithe tunnel, the new Vauxhall bridge, Kingsway and Tramway Subway and the duplication and extension of the London Main Drainage System. In 1913 he visited Australia to advise on naval harbors and works; visited the British front in Flanders in 1915 at the request of the War Office to advise on questions of drainage. He wrote 'Plate Girder Railway Bridges' and 'Main Drainage of London.'

FITZMAURICE-KELLY, James, English scholar: b. 20 June 1858. He was appointed Gilmour professor of Spanish in Liverpool University in 1909, and has published 'The Life of Miguel de Cervantes Saavedra' (1892); 'History of Spanish Literature' (1898); 'Lope de Vega' (1902); 'Chapters on Spanish Literature' (1908); 'A Memoir of Cervantes' (1913); and he has edited the complete works of Cervantes.

FITZPATRICK, Charles, Canadian lawyer and politician: b. Quebec, 19 Dec. 1853. He was graduated at Laval University in 1873 and being admitted to the bar in 1876, was appointed Crown prosecutor for the city and district of Quebec 1879 and 1887. He was a member of the Quebec assembly 1890–96 and was elected to the Dominion Parliament 1896 was Solicitor-General 1896–1902, Minister of Justice 1902–06 and became chief justice of the Supreme Court of Canada in 1906. He was British representative on The Hague Tribunal on the North Atlantic fisheries reference before that tribunal in 1910, to which Canada and the United States were parties.

FITZPATRICK, William John, Irish author: b. Dublin, 1830; d. 1896. He received his education at the Jesuit College of Clongowes Wood and at Trinity College, Dublin. He became professor of history at the Royal Hibernian Academy in 1876. He was the author of several biographical and historical works, which are of great value to the student of Irish history. They include 'Life of Lord Cloncurry' (1855); 'The Life, Times and Correspondence of Dr. Doyle, Bishop of Kildare and Leighlin' (2d ed., 1880); 'Lord Edward Fitzgerald' (1859); 'The Sham Squire' (1866); 'Irish Wits and Worthies' (1873); 'Life of Charles Lever' (1879); 'Life of Thomas N. Burke O. P.' (1886); 'Daniel O'Connell the Liberator: His Letters and Correspondence' (1889); 'Secret Service Under Pitt' (1892).

FITZRALPH, Richard, English prelate: b. Dundalk, Ireland, about 1300; d. Avignon, 16 Nov. 1360. He took orders, becoming Fellow of Balliol College, Oxford, and being made chancellor 1333. He was appointed archbishop of Armagh 1347: He earned a great reputation as a preacher and was much in favor with the Pope at Avignon. He took a prominent part in the refutation of the heresies of the Armenian Christians, and took up the cause of the secular clergy against the mendicant friars in England, declaring that mendicancy had no warrant either in Scripture or primitive tradition. In connection with the former he wrote an argument, 'Summa in Questionibus Armeniorum,' and in reference to the latter a treatise 'De Pauperie Salvatoris.' When summoned by the friars before Pope Innocent VI he defended himself in a notable sermon, 'Defensio Curatorum,' but died before the case was decided. His bones were taken to Dundalk 1370, where his tomb became an object of veneration.

FITZROY, Augustus H. See GRAFTON, DUKE OF.

FITZROY RIVER, the name of two Australian rivers, one in western Australia and one in Queensland. The former rises in the King Leopold Mountains, empties in King Sound and is navigable for 100 miles; length 300 miles. The Queensland River is formed by the junction of the Mackenzie and the Dawson, discharges in Keppel Bay and is navigable to Rockhampton, 35 miles from its mouth.

FITZSIMMONS, Robert, Australian-American pugilist: b. Helston, Cornwall, 4 June 1862; d. Chicago, — Oct. 1917. At the age of nine he migrated with his parents to New Zealand, and was settled as a blacksmith at Timaru when Jem Mace promoted a local heavyweight competition, which Fitzsimmons won. Within a year after his début in the ring he was champion of New Zealand. A successful contest with Herbert Slade, the big Maori, who afterward fought Sullivan, induced the blacksmith to adopt fighting as a profession. He went to Australia, won various contests, and met his first defeat at the hands of Jem Hall for the middleweight title. He reversed this verdict three years later, when he knocked Hall out in four rounds at New Orleans. On his arrival at San Francisco Fitzsimmons was matched against Jack Dempsey for the middleweight championship of the world. The American fell in the 13th round. Peter Maher, the Irish heavyweight, was next beaten in 12 rounds. Except for a draw with Joe Choynski in Boston in June 1894 and a dubious "foul" verdict against him in a fight with Tom Sharkey in December 1896, Fitzsimmons enjoyed an uninterrupted series of victories for the next six years. On 17 March 1897 he defeated James J. Corbett at Carson City and won the heavyweight title. He met the gigantic Jim Jeffries at the Coney Island Athletic Club on 9 June 1899 and was defeated. He determined to fight Jeffries again, meanwhile knocking out all who came before him, including Gus Ruhlin, "the Akron giant," and Tom Sharkey. On 25 July 1902, when 40 years old, he again faced Jeffries, who was severely battered in the opening rounds and came near to defeat, but whose tremendous strength and courage finally overcame the veteran in the eighth round. Fitzsimmons encountered — after several victories — another defeat in December 1905 by Jack O'Brien in 13 rounds. He made two more attempts — against Jack Johnson in July 1907, and against Bill Lang, when 50 years of age. Fitzsimmons flourished in the palmy days of the boxing ring; he held simultaneously the heavy, light-heavy and middleweight championships of the world. He never fought in England, his native country; though Australian by training, it was in the United States that he won most of his fame. He was a naturalized American citizen.

FITZWALTER, Robert, English baron, leader of the opposition to King John: d. 1235. He was a member of the official aristocracy and a follower of John in his Norman wars. In 1212 he was an opponent of the king because, as he alleged, the latter had attempted to seduce his daughter. Being implicated in the baronial conspiracy he escaped punishment by fleeing to France. He returned under an amnesty and continued his agitation against the king, being chosen "marshal of the army of God and Holy Church" in 1215. Under his leadership the barons forced the king to sign the Magna Charta and was appointed one of the 25 executors of the famous charter. He encountered bitter opposition from the royal party and was constrained to seek aid from France. He was disliked by the French, but served King Louis faithfully until his capture at Lincoln in 1217. Fitzwalter joined the Damietta crusade in 1219, and soon after returned to England. Consult Michel, F. (ed.), 'Histoire des ducs de Normandie et des rois d'Angleterre' (Paris 1840).

FITZWILLIAM MUSEUM, The, an institution at Cambridge University, England, founded by a bequest of Richard, 7th Viscount Fitzwilliam (1745–1816). He left to it a large collection of books, paintings and engravings, to which successive additions have since been made, the most important being the Marlay Collection, added in 1912. It contains many artistic treasures, including works of Holbein, Turner, Rubens, Gainsborough, Hogarth and Rembrandt. The collections are housed in a fine building in Grecian style.

FIUME, fē-oo'mĕ, Austria-Hungary, royal free town and seaport, geographically a part of Croatia, but forming, together with its adjoining territory, since 1870, a political division of the kingdom. It is picturesquely situated at the head of the Bay of Quarnero, an inlet of the Adriatic, and is about 40 miles southeast of Trieste. The views of the bay and town are beautiful, and the environs are attractive. Fiume consists of the old town built on a hill, with crooked narrow streets, and the new town stretching along the shore, with fine broad streets, handsome squares and numerous elegant public buildings. The public garden is particularly worthy of mention. Among the edifices, the most interesting are the cathedral (founded 1377), with a modern façade in the style of the Pantheon at Rome; the church of Saint Vitus; the Pilgrimage Church, approached by a stairway of 400 steps; the town hall, the government buildings, the Naval Academy and the municipal theatre. There is a Roman triumphal arch, supposed to have been erected to Emperor Claudius II Gothicus. Fiume has several harbors, the largest, begun in 1872, being capable of accommodating 150 large vessels. It is protected by a breakwater

3,250 feet in length, flanked by a quay nearly two miles long. The entire port is lighted by electricity. The city, owing to the active interest shown by Hungary in this, its only important seaport, has an extensive and steadily increasing commerce. The chief articles of import are wine, rice, tobacco and raw jute; of export, flour, sugar and lumber. The manufactures of Fiume are flourishing. The chief industrial establishments are the government tobacco factory, the large Whitehead torpedo works, an enormous petroleum refinery, a rice-shelling factory, an extensive paper mill, flour mills, saw mills, tanneries and rope factories. The fisheries are important, those of tunny being especially rich.

Fiume is fully equipped with banks, commercial unions and industrial associations. It is administered by a governor, who is a member of the Upper House of the Hungarian Parliament. The town sends one representative to the Lower House. The chief educational institutions are the Naval Academy, a royal gymnasium and two high schools. There is a United States consul. Fiume with its territory has an area of 21 square kilometers (8.1 square miles). Pop. (1910) 49,886, chiefly Italians, Illyrians and Croatians. Of the total in 1910 over 45,000 were Roman Catholics and over 36,000 could read and write. Fiume was a town of the Byzantine empire. In the 9th century it was ruled by its own dukes. In 1471 it came into the possession of Austria and in 1779 was attached to the Crown of Hungary. From 1849 to 1870 it formed part of Croatia. During the European War 1914–18, Fiume was a centre of great military and naval activity and was frequently attacked by Italian naval and aerial forces. See War, European.

FIVE-CENT PIECE, HALF-DIME, or «NICKEL.» Silver half-dimes (originally they were called in official language «half-dismes») were the first coins struck in October 1792 at the first United States Mint in Philadelphia under the Coinage Act of 2 April 1792. They contained 18 9/16 grains of pure or 20 4/5 grains of standard (alloy) silver. These weights were changed at various times by the successive acts of 1837, 1853 and 1873. The silver half-dime was discontinued by the act of 1873. Its place was taken by the five-cent piece, commonly known as «Nickel,» authorized by the act of 16 May 1866, weighing 77.16 grains and consisting of 75 per cent copper and 25 per cent nickel. Both half-dimes and five-cent pieces have undergone various changes in design. None were coined in 1798, 1799, 1804 or 1806 to 1828. (See Coin; Numismatics). Consult Anon., 'The Monetary Legislation and Currency System of the United States' (in United States Mint Bureau, 23d Annual Report of the Director, pp. 116–189, Washington 1895); Evans, G. C., ed., 'Illustrated History of the United States Mint, etc.' (Philadelphia 1890); United States Mint Bureau, 'Catalogue of Coins, etc., in the Numismatic Collection of the Mint of the United States in Philadelphia' (3d ed., Washington 1914).

FIVE CIVILIZED TRIBES. See Indian Affairs.

FIVE FORKS, Battle of. At the close of the battle of Dinwiddie Court House, 31 March 1865, General Sheridan was holding a position in front of the place, General Pickett, with infantry and cavalry, confronting him. At 12 P.M. Pickett, threatened by Warren's Fifth corps on his left, ordered a retreat to Five Forks, some 15 miles to the southeast, to protect his communications with the South Side Railroad. Sheridan followed him at daylight with Devin's and Custer's divisions, Crook's division being thrown on roads to the left. Pickett was found entrenched at Five Forks. By 1 P.M. Sheridan's cavalry had worked close up to Pickett's lines, and Sheridan ordered up the Fifth corps. MacKenzie's cavalry division, advancing on the extreme right, drove back Robert's cavalry and gained the White Oak road.

At 4 P.M. Warren had formed his lines, Ayres' and Crawford's divisions in double lines, with one brigade in reserve, on the left and right respectively of the Gravelly Run Church road. A few moments brought Warren to the White Oak road, and Ayres, whose right had crossed it, received a severe fire upon his left, and at once changed front and attacked the return of the entrenchments. Crawford kept straight on through the woods and, receiving fire from Munford's cavalry, swerved to the right, thus isolating his division from Ayres, and Griffin followed Crawford. But Griffin and his brigade commanders, taking in the situation, soon marched by the left flank and protected Ayres' flank, which had been thrown into some confusion. Ayres meanwhile, connecting with the cavalry on his left, had made a gallant charge, carried the left of the Confederate works and, with support on the left and right, swept down inside them to and beyond Five Forks, capturing many prisoners. The only stand the Confederates tried to make was on the road leading to the railroad, and at this point they were pressed so closely by Griffin and Crawford that they soon gave way. On the right Warren took Crawford's division in hand, changed its direction to the left and, advancing in rear of the Confederate infantry line, with MacKenzie's cavalry on the right, drove Munford's cavalry, continually turning the left of the Confederates opposing Ayres and Griffin, gained the road leading to the South Side Railroad, forced Munford north of Hatcher's Run, and took four guns and many prisoners. On the extreme left Custer had a severe fight with cavalry and infantry, and gained but little ground until Devin and Ayres advancing behind the works drove the infantry out. The Confederate cavalry made no further stand, save to cover the retreat, and just before dark Custer, in connection with an attack by a small body of the Fifth corps, led by Warren in person, drove the last of the Confederates westward on the White Oak road, and followed them until long after dark. The battle was one of the most decisive of the war. The Confederates were totally routed, losing over 5,000 men captured, 6 guns and 11 colors. The Union loss was 830 killed and wounded, of which the Fifth corps lost 634. The Confederate loss in killed and wounded is not definitely known. Consult Humphreys, A. A., 'The Virginia Campaign of '64 and '65, etc.' (New York 1883); Powell, W. H., 'The Fifth Army Corps' (New York 1896); Sheridan, P. H., 'Personal Memoirs' (2 vols., New York 1888); United States War Department, 'The War of the Rebellion. Official Records' (Ser. I, Vol. XLVI, part 3, Washington 1893; Atlas, Washington 1891–95). E. A. CARMAN.

FIVE HUNDRED, Council of *(Conseil des Cinq Cents)*, the lower house of the legislature, created under the French constitution of 1795 (III). According to the constitution two-thirds of the council was to be made up from the membership of the convention. All legislation was to be initiated and debated by the council which reported its action to the Conseil des Anciens, or upper chamber. The council was dissolved by Bonaparte on 10 Nov. 1799 (19 Brumaire, of the Year VII). See FRANCE; HISTORY.

FIVE MEMBERS, The, a collective name applied to the five members of Parliament whom Charles I attempted to arrest by appearing in the House of Commons with an armed force on 4 Jan. 1642. They were John Pym, John Hampden, Denzil Holles, Sir Arthur Haselrig and William Strode, representing in the Commons Tavistock, Buckinghamshire, Dorchester, Leicestershire and Beeralston respectively. The king, expecting an impeachment of the queen, determined to prevent it by impeaching these commoners along with Lord Kimbolton and at the same time take revenge on these men for the leading part which they had taken in the matter of the Grand Remonstrance (q.v.). On 3 Jan. 1642 he sent their impeachment to the two houses and demanded their delivery to him. The impeachment was subsequently abandoned when the Commons had declared against the illegality of his procedure. (See ENGLAND). Consult Forster, J., 'Arrest of the Five Members by Charles I' (London 1860); id., 'The Debates on the Grand Remonstrance, 1641' (London 1860); Gardiner, Cordery, B. M., and Phillpotts, J. S., 'King and Commonwealth' (Philadelphia 1876); Gardiner, S. R., 'The Fall of the Monarchy of Charles I' (2 vols., London 1882); id., 'The Constitutional Documents of the Puritan Revolution' (Oxford 1889).

FIVE MILE ACT. An act known as the Clarendon or Oxford Act passed by Parliament in 1665. It prohibited any clergyman ejected from his living in 1662 by the enactment of the Act of Uniformity from approaching nearer than five miles to any town, city or parish where he had formerly preached. The penalty for disobedience was £40. It was a severe blow to the Puritans. The text of the act is in the volume of 'Documents,' edited by Gee and Hardy, pp. 620–623.

FIVE NATIONS. See IROQUOIS.

FIVE POINTS, New York, a locality between Centre and Worth streets and Park street. At one time it was noted as a resort for criminals and "hard cases." Under the auspices of the Ladies' Home Missionary Society of the Methodist Episcopal Church, the late Rev. L. M. Pease and Mrs. Pease began reform work at Five Points in 1850. The church of the Ascension for a few years contributed funds to establish an industrial school which, in 1854, was incorporated and became a separate institution. The mission secured by purchase and by building an excellent home, which they occupied until 1909 when the institution was moved to the country. A city reception house is still maintained at 454 West 23d street, New York. In 1911 Mr. and Mrs. W. C. Osborn presented a 286-acre farm at Pomona, Rockland County, N. Y., on which the institution is now located in form of a farm colony. Since its foundation it has been instrumental in the reclamation of thousands of destitute, especially of children, on whom, during most of its existence, the work has been centred. Many years previous to its removal the institution was an important factor in changing the entire neighborhood greatly for the better. The most important step in this direction was the creation of a park and playground, on immediately adjoining territory. In more recent years the entire neighborhood has practically lost its identity by the purchase and destruction of most of its buildings on the part of the city of New York to make room for a new courthouse and other municipal improvements which, however, have not been carried out, so that for a number of years the region has been unused. Consult Anon, 'The Five Points' (in *National Magazine*, Vol. II, pp. 169 and 267, New York 1853); Barnard, W. F., 'Forty Years at the Five Points' (New York 1893); Five Points House of Industry, 'Annual Reports of the Trustees' (New York 1855 ff.); Five Points Mission, 'The Old Brewery and the New Mission House at the Five Points, etc.' (New York 1854).

FIVE POINTS OF DOCTRINE, the principal subjects of doctrine which are disputed topics between Arminians and Calvinists. They are: (1) extent of the atonement; (2) predestination; (3) free will; (4) grace; (5) final perseverance. Various efforts have been made to settle the differences; they were fully discussed at the Synod of Dort (q.v.), in Holland, in 1618–19; at Cambridge, in England, in 1594, and at two other conferences held in England in 1626.

FIVE-TWENTIES (that is, redeemable after 5 years and payable in 20 years), 6 per cent gold bonds issued in 1862, 1864 and 1865.

FIVES, (1) English game, in the United States usually called handball, in which the ball is struck against a wall with the hand, usually protected by a glove. It is played either in close or in open courts, though more frequently in the open, of various shapes and proportions. In England there are two varieties, the Eton and the Rugby game. The origin of the name is disputed. (See HANDBALL). Consult Heathcote, J. M., 'Tennis, Lawn Tennis, Rackets, Fives' (London 1890); Tait, A., 'Fives' (in 'All England Series,' London 1893–date). (2) Also a disease in horses, resembling the staggers, and consisting of an inflammation of the parotid glands; written correctly vives.

FIXED AMMUNITION. See AMMUNITION.

FIXED OILS, in medicine, non-volatile oils used as demulcents, laxatives and in external application as emollients. Some, notably linseed oil, while still in the seed, are very useful in poultices because of the high specific heat of the oils. By means of this specific heat the poultice stays warm much longer. Others of the fixed oils are useful as foods — cod-liver oil, peanut oil, etc. See OIL.

FIXING. (1) *In machinery*, a piece of cast iron adapted to carry pillow blocks and the like. When it is built into a wall it is called a wall fixing, or wall box; when attached to a wall by bolts it is a plate fixing. There are also beam fixings, as when wheels are intended to work at the position where the fixing is situated; and when the fixing is adapted to them, it is then commonly called a wheel fixing. (2) *In metallurgy,* the material used in preparing the hearth of a puddling or boiling furnace for receiving its charge. It is called fettling in some parts of England. (3) *In photography,* of a negative; the removal, by a solution of hyposulphite of soda or cyanide of potassium, of the unaffected deposit of iodide and bromide of silver in the collodion film after exposure and development of the picture. Of a positive; the removal of the unaltered chloride of silver from the surface of the photographic paper after exposure under the negative.

FIXTURES, in American and English law, chattels so attached to the freehold as to constitute, in legal contemplation, a part of it. The harshness of the common law favoring the freeholder in this matter has been much modified in late years by statutes and by decisions of the courts, both in the United States and in the British Empire. The question as to whether a chattel is to be treated as such or as a fixture and therefore a part of the realty is important because of the radically different rules of law which apply to the disposition or acquirement of personalty and of realty. The question arises very frequently in the relations of landlord and tenant, of buyer and seller, of executor and heir, and of executor and remainderman or reversioner.

As to what constitutes a fixture is largely determined by the circumstances in each case, but a controlling factor is whether there has or has not been any actual annexation to the soil. The general rule at common law is that if a tenant affixes a chattel to the freehold during his tenure he may not remove it except by the permission of the owner. Both in the United States and Great Britain, an exception has been made in the case of trade fixtures, subject to the qualification that the removal must be made by the tenant before the close of his term. However, it has been held that even trade fixtures cannot be removed by a tenant if such removal causes injury to the freehold, changes the nature of the articles or is contrary to the usual custom of the community. Buildings erected by the tenant may or may not be fixtures. They are not such if built upon rollers, blocks or the like. Ornamental fixtures, as chandeliers, marble chimney-pieces and pictures, particularly when secured by screws, have been held to belong to the tenant. Heavy objects, as monuments, unattached to the realty in any manner except by their own weight, if intended to improve the freehold permanently, have, on the contrary, been held to be fixtures.

In both England and the United States the rule as to what constitutes fixtures varies somewhat with the parties in controversy. The American decisions are not in accord with the English holding that a tenant, in the absence of an express agreement or permission by the landlord, cannot remove buildings erected by the former for agricultural purposes. English decisions favor the heir as against a remainderman. As between seller and buyer the tendency in both countries is to consider all questionable articles as fixtures, although the intention of the parties has weight, and the same rule applies as to mortgagor and mortgagee. Likewise the heir is favored as against the executor.

Annexation may be either actual or constructive. As examples of articles held to be constructively annexed may be cited deeds and chattels relating to the title of the inheritance, and these go to the heir.

A tenant for years may exercise the right of removal after his term if he is in possession and rightfully holding over.

FIZEAU, fī-zō', **Armand Hippolyte Louis,** French physicist: b. Paris, 23 Sept. 1819; d. Venteuil, 18 Sept. 1896. His first researches were in photography. Together with J. B. L. Foucault (q.v.), he carried on researches concerning the interference of heat and of light. The results as to the velocity of light (q.v.) that constitute his best-known work were published in 1849; and in 1850, with the collaboration of E. Gounelle, he determined the speed of the electric current. His later investigations dealt with the use of condensers in connection with the induction coil, and with the expansion of solids by heat and its measurement by means of the interference of light. In 1860 he was elected to the French Academy and from 1878 on he was a member of the Bureau des Longitudes.

FJORD. See FIORD.

FLABELLUM. See FANS.

FLACCUS, Caius Valerius, kā'yus valē'rĭ-us flak'us, Roman poet of the latter half of the 1st century. Very little is known about him definitely, except that he died about 90 A.D. in which year Quintilian laments his recent death. Some authorities add Setinus Balbus to his name, but it is doubtful whether these two words were really part of his name, though they appear on a manuscript of his work in the Vatican. He is also frequently confused with a poet friend of Martial. He sung the expedition of the Argonauts in an epic poem, 'Argonautica,' of which seven books and part of the eighth have remained to us. It is partly a translation and partly an imitation of a similar work by Apollonius of Rhodes. It was dedicated to Vespasian and apparently took him at least 10 years to write. The estimates of his work vary greatly. He has little originality and is most of the time deadly monotonous and very artificial. On the other hand his Latin is pure, and both in style and versification he is very nearly perfect. His work is comparatively unknown, though there are a number of editions (Bologna 1474; Florence 1503; Paris 1519; Venice 1523, etc.). More recent editions are by Walker, W. S. (London 1848); Thilo, G. (Halle 1863); Schenke, C. (Berlin 1871); Baehrens, H. (Leipzig 1875); Lanzen, P. (Berlin 1896). It has been translated into French (Paris 1811, 1826, 1850); German (Erfurt 1805); Hungarian (Pesth 1873); Italian (Milan 1731, 1754; Verona 1776); Spanish (Madrid 1868-69). Of English translations the following should be mentioned: Noble, T., 'The First Book of Argonautica' (in 'Blackheath, etc.,› London 1808); Pinder, N., ‹Selections from the Less Known Latin Poets› (in ‹Clarendon Press Series,› Oxford 1869); a new translation of the complete work has been begun by H. G. Blomfield of which the first volume has appeared so far: Valerius Flaccus, Caius, ‹The Argonautica› (Oxford 1916). Consult Butler, H. E., ‹Post-Augustan Poetry› (London 1909); Harmand, R., ‹De Valerio Flacco Apollonii Rhodii Imitatore, etc.› (Nancy 1898); Merivale, C., ‹History of the Romans under the Empire› (7 vols., London 1852–62); Peters, J. V., ‹De Caii Valerii Flacci Vita et Carmine› (Königsberg 1890); Samuelson, J., ‹Studia in Valerium Flaccum› (Upsala 1899); Schenkl, K., ‹Studien zu den Argonautica des V. Flaccus› (in *Kaiserliche Akademie der Wissenschaften, Philos.-Hist. Classe, Sitzungsberichte,* Vol. LXVIII, p. 271, Vienna 1871); Summers, W. C., ‹Study of the Argonautica of Valerius Flaccus› (Cambridge 1894).

FLACCUS, Marcus Verrius, Roman teacher of the 1st century B.C. He was a freedman, was among the most eminent of the savants of his time and became tutor to the grandson of Augustus. In ‹De Verborum Significatu› he gave in vocabulary order an explanation of obsolete terms and phrases. Festus wrote an abridgment of this work which is now lost. Flaccus also wrote the ‹Fasti Prænestini,› a calendar of Roman festivals. It was set up in the form of Præneste, and fragments have come to light in modern times. Consult Schanz, ‹Geschichte der römischen Litteratur› (3d ed., Munich 1911); and Teuffel, ‹Geschichte der römischen Litteratur› (6th ed., Leipzig 1910).

FLACH, flạsh, **Geofroi Jacques,** French historian: b. Strassburg, Alsace, 16 Feb. 1846. He studied classics and law at the University of Strassburg, where he received the degree of LL.D. in 1869. He endeavored to explain law problems by means of history, a method new to the France of his day. The Franco-Prussian War, however, led him into new activities and he spent two years in rebuilding the library and museum, which had been destroyed by the Prussian bombardment. When at last he came to choose definitely between French and German citizenship, he removed to Paris, where he resumed his studies. In 1879 he was made assistant to Edouard Laboulaye at the Collège de France, and in 1884 became professor of comparative legislation there. He was also professor of comparative law at the École Libre des Sciences Politiques. In connection with his duties in these positions he studied the various civilizations of the world. He concentrated, however, on early French law which led him to study extensively the origin and development of the feudal system, of which his ‹Les Origines de l'ancienne France› (3 vols., 1886–1904) is an exhaustive treatment. He was elected member of the Academy in 1912. Other works by him are ‹Histoire du régime agraire de l'Irlande› (1883); ‹Considérations sur l'histoire politique de l'Irlande› (1885); ‹Jonathan Swift, son action politique en Irlende› (1886); ‹L'origine de l'habitation et des lieux habités en France› (1899); ‹Cujas, les glossateurs et les Bartolistes› (1883); Études critiques sur l'histoire du droit romain au moyen âge, avec textes inédits› (1890).

FLACIUS, flā'shĭ-us, or **VLACICH, Matthias,** mät-tē'äs·flä'sĭн, German Lutheran theologian: b. Albona, Illyria, 3 March 1520; d. Frankfort-on-Main, 11 March 1575. He is usually called Flacius Illyricus. After studying at Venice, Basel and Tübingen he went in 1541 to Wittenberg, where he became a pupil of Luther and Melanchthon. In 1544 he became professor of the Hebrew Scriptures at Wittenberg University. From this time he took an active part in all the theological discussions of the time; and for his attacks on Melanchthon's compromise, known as the Leipzig Interim, he was, four years later, deprived of his professorship. Nor did he procure another appointment until 1557, when he became professor of theology at Jena. This post he again lost, after four years, on account of his doctrine that original sin was essentially inherent in man's nature. From then on he was continuously in trouble with church and civil authorities, and was driven successively from Regensburg, Antwerp and Strassburg. He finally went to Frankfort-on-Main from where he was again to be deported when he was taken mortally ill. He published a large number of works, most of which were comparatively short and of a controversial nature. Of his larger writings the following deserve mention: ‹Catalogus Testium Veritatis› (Basel 1556); ‹Ecclesiastica Historia,› more frequently called ‹Magdeburger Zenturien› (Basel 1559–74); ‹Clavis Scripturæ Sacræ (Basel 1567). Consult Holländer, A., ‹Der Theologe M. Flacius Illyricus in Strassburg› (in *Deutsche Zeitschrift für Geschichtewissenschaft,* n. s. Vol. II, p. 203, Freiburg 1897); Preger, W., ‹M. Flacius Illyricus und seine Zeit› (2 vols., Erlangen 1859–61); Ritter, J. B., ‹M. Flacci Illyrici Leben und Tod› (Frankfort-on-Main 1725); Schaeffer, C. F., ‹Flacius Illyricus and his Times› (in *Evangelical Quarterly Review,* Vol. XIV, p. 481, Gettysburg 1862–63); Twesten, M., ‹M. Flacius Illyricus› (Berlin 1844).

FLACOURT, fla'koor, **Etienne de,** French colonial pioneer: b. Orléans 1607; d. at sea, 10 June 1660. From 1648 to 1655 he was in command of the troops in Madagascar, having been made governor by the French East India Company. Being cut off from France he acted on his own initiative, restored order among the troops, but was very severe in his treatment of the natives, who harassed him throughout his term of office. Soon after his return to France in 1655 he was made director-general of the French East India Company, but returned again to Madagascar and was drowned on a voyage home to France. He published ‹Petit catéchisme madécasse et français› (1657); ‹Dictionnaire de la langue de Madagascar› (1658); ‹Histoire de la grande île de Madagascar› (1658). Consult Malotet, A., ‹Etienne de Flacourt, ou les origines de la colonizations françaises à Madagascar 1648–1661› (Paris 1898).

FLAD, Henry, American civil engineer: b. Bavaria, Germany, 1823; d. 1898. He was educated at the College of Spire, Rhenish Bavaria, and at the University of Munich. He became assistant engineer on various government public works, chiefly with improvement of the Rhine, but in 1849 became a captain in the Baden revolutionary army. The failure of the revolution rendered his position in Germany insecure and he fled to the United States, where he was engaged in the engineering departments of several railroads until the outbreak of the Civil War, when he enlisted and rose to the rank of colonel of engineers. From 1867 to 1874 he was chief assistant to James P. Eads on the great bridge over the Mississippi at Saint Louis. After 1877 he was president of the Board of Public Improvements of Saint Louis and for many years served as member of the Mississippi River Commission.

FLAG, a strip of cloth of a light fabric, varying in form and color, frequently bearing some emblematic design, and ordinarily fixed by one end to a staff, pole, rope, etc., while the other is allowed to fly free. The length of a flag from the part near the staff to the free end is called the fly, and the measurement at right angles to this is known as the hoist, height or depth.

The uses of flags are numerous. They serve in a variety of ways as signals. They convey definite information of various kinds, and are used as general symbols of rejoicing, congratulation, sympathy, mourning, etc. In a classification of the uses of flags, that which stands first, as the most general, is their use as national emblems. Next in order comes their use as distinguishing emblems of the naval and military forces of particular nations. In the army each regiment is distinguished by its particular flag or colors. This usage is general, and the colors of regiments come to be distinctive of their services and of their *esprit de corps*, as well as of their position in the army. Flags are sometimes presented by persons of rank or official station, or by other individuals or groups of people, and often bear names and emblems commemorative of past achievements. In the majority of countries the presentation of regimental flags is attended by a religious ceremony. This use of flags is of great antiquity. In the Bible the standards of the different tribes are referred to in the arrangement of the camp of the Israelites in the desert. The Greek and Roman armies had their distinctive flags. In the French army distinctive flags were introduced during the wars in Italy in the 16th century. The word *drapeau* in French (which, in its most extended signification is equivalent to our «flag») is used specifically for the colors of an infantry regiment; *étendard* for those of a cavalry regiment; *pavillon* for the colors used in the naval service.

The union of Saint Andrew and Saint Patrick marks, first, the union of England and Scotland into the kingdom of Great Britain and then this kingdom with Ireland. This is the union flag of Great Britain, and was brought by colonists to America. (See Flag of the United States). The flags of the British dominions and colonies differ from those of the mother country by the badge of the colony being placed in the centre of Union Jack. Every battalion of infantry in the British army, except the Rifles, has two colors; namely, the king's color and the regimental color. The former consists, for all regiments, of the union device, with the name of the regiment in the centre and the number of the battalion on the upper part near the staff. The regimental color is of the same color as the collars and facings of the regiment; but if these are white, it bears a Saint George's cross in red. On it are emblazoned the name of the regiment, the names of the battles in which it has served, and its various badges, crests, mottoes, etc. Among cavalry regiments, only the guards, dragoon guards and dragoons have standards, as cavalry flags are termed. These are made of crimson silk, and are emblazoned like those of infantry regiments. The standards of the guards and dragoon guards are rectangular, like those of the infantry, but the dragoons carry standards with the end farthest from the staff rounded and scalloped. The lancers have red and white pennants on their lances.

The standard is the war-flag, and bears the royal or other arms of the nation. Ensigns are flags carried by ships to indicate their nationality. The place for the ensign in a steamer or large ship is on a pole over the taffrail; in schooners and similar ships, at the peak of the main gaff; in cutters and sloops, at the peak; in yawls, at the mizzen-peak; and in rowing-boats, over the stern.

Jacks are national flags used for signaling and various other purposes. Pennants or pendants are small pointed or swallow-tailed flags generally used in connection with signals. The best known is the answering pennant used in the international signal-code. A burgee is a swallow-tailed flag used by yachts and merchant vessels, usually with the ship's name on it. Shipping companies generally have square flags with distinctive colors and devices; these are known as house-flags. A plain white flag indicates a clean bill of health; and is also used in war as the flag of truce (q.v.). The quarantine flag is yellow. Vessels carrying explosives display a red flag. A flag hoisted upside down is a signal of distress, and one borne half-mast high is a sign of mourning. Striking the flag is a token of surrender, and the placing of the flag of one country over another is a token of victory for the former. The dipping of a flag is a mark of respect. See Flag of the United States; Flags, Confederate; Flags of Foreign Nations; Signal Service.

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FLAG, Sweet, an aquatic, flag-like plant (*Acorus calamus*) of the family *Araceæ*, which grows in wet places throughout the northern hemisphere, and is well known for its sweetly odorous leaves and root. The leaves are sword-shaped, one to three feet long, and the spadix is lateral with bisexual flowers. The creeping woody rhizome has long been employed in medicine as an aromatic stimulant, considered useful in ague in Great Britain, and in India as a remedy for intestinal ills among children. It is also employed in flavoring beer, and by makers of snuff and vinegar; and is chewed by singers to clear the voice.

FLAG ASSOCIATION, The American, an organization formed in the council chamber of the city hall, New York, 12 Feb. 1898, with the object of honoring the national flag and of protecting it from desecration by securing the enforcement of present laws and the enactment of others for that purpose. Its motto is «One Flag, One Country, God Over All.» The association was an outcome of the Congress of National Patriotic Societies held at the same place in November 1897, and besides individual members it is composed of the members of these societies, many of which are actively represented in the association by their flag committees. In order to promote respect and love for the flag, the association encourages its proper display on private buildings, schoolhouses, churches, etc., and uses its influence to make the observance of Flag Day (June 14) a national custom.

FLAG DAY. The 100th anniversary of the birth of the American flag was on 14 June 1877, the Continental Congress having adopted the stars and stripes on 14 June 1777, and the government at Washington requested that all public buildings float the flag in honor of the day. A like respect was shown for the natal day of the flag in New York, where all government and municipal buildings hoisted the colors; Boston, too, observed the day by exercises and display of American flags; Philadelphia was equally eager to show reverence and at Independence Hall a program was given as also at the old home of Betsey Ross, where the first American flag was constructed. At the celebration in South Church, Boston, the centre of attraction was the original Fort McHenry flag which inspired Francis Scott Key to write the ‘Star Spangled Banner.’ The earliest effort to make the day into an annual and national holiday was when Dr. B. J. Cigrand wrote in the June issue of the *Chicago Argus* an article entitled, «The Fourteenth of June,» in which he advocated a national holiday for every month of the year; while teaching school at Fredonia, Wis. in 1886, he directed attention to the memorable event and the pupils wrote essays on the theme, he having furnished the item from the *Youths' Companion* of 1883. In many magazine and newspaper articles he advocated recognition of this memorable day in the history of the American flag — calling it «Flag-Birth-Day,» notably *The Home, School and Nation* (Vol. III, No. 1, 1891); *The Student* (Vol. II, No. 7, page 396); ‘Heraldic History of United States Flag’ (Vol. II, 1st ed., 1889); *Our Country*, June 1889. In an address to the Sons of America, June 1888, he emphasized the good that would come from such a flag holiday, which resulted in the Sons organizing a corporation and publishing monthly a magazine, *The American Standard*, to inculcate reverence for American emblems, and he was its editor-in-chief. The outgrowth of this patriotic work was that his efforts along these lines brought much encouragement.

A similar flag respect was shown by George Balch, teacher in a free kindergarten of New York city, where he, on 14 June 1889, observed the natal day of the U. S. flag. The Betsey Ross home at Philadelphia, on 14 June 1890, likewise, celebrated the day; the New York Society, Sons of the Revolution, celebrated 14 June (to commemorate 14 June 1777) in 1891 and have ever since observed the day, by erecting a monument on some spot of historic interest. Col. George A. Cantine of Newburg, N. Y., a veteran of the Civil War, conducted a patriotic flag celebration 14 June 1891, and in 1893 Le Roy Van Horn, of Chicago, a veteran of the Civil War, conducted with the aid of G. A. R. men a flag drill and exercise at Douglas Park, Chicago, on the third Saturday of June, and in 1893 Le Roy Van Horn and Dr. B. J. Cigrand were brought together and the latter issued a newspaper call reading «All persons who desire to commemorate the birthday of the American flag, adopted 14 June 1777, are invited to meet at 8 P.M. in the assembly hall of the Grand Pacific Hotel.» This was in 1894 and was the origin of the Illinois Corporation known as The American Flag-Day Association, whose purpose was to celebrate the third Saturday in June and to conduct the exercises in the interest of public school children. The officers were Gen. Theodore F. Brown, president; Dr. B. J. Cigrand, secretary; Blanch E. Reynolds, vice-president (authoress of the «Living Flag» in which people formed the stripes and stars at the World's Fair 1893); Capt. E. R. Lewis, treasurer; LeRoy Van Horn, musical director. Annually this organization held celebrations in the five large parks of Chicago, but always on the third Saturday of June; but in 1896 when Dr. B. J. Cigrand became the State president, he directed that the actual date, 14 June, be observed and on that date celebrated the day at Humboldt Park, Chicago. Because of the great success of the actual date celebration a national organization was effected of which Dr. Cigrand became the president and the directing spirit; and to this National Society, 36 governors, scores of mayors and five Presidents of the United States have sent delegates and approving credentials that «Flag Day» be observed on the actual date (not third Saturday of June) in all States of the Union. This National Flag Day Society, aside from having established the actual day (14 June), labors in the interest of the entire population — all classes are invited — the pupils of the parochial, private and public schools, academies, colleges, universities, clubs and industrial institutions to join annually and participate in Flag Day; and by this liberal policy exemplify the broad and tolerant spirit of the Flag itself, so well expressed by President Wilson at the Flag Day celebration at Washington, D. C., 14 June 1914:

«This flag for the future is meant to stand for the just use of undisputed national power. No nation is ever going to doubt our power to assert its rights, and we should lay it to heart that no nation shall ever henceforth doubt our purpose to put it to the highest uses to which a great emblem of justice and government can be put.

«It is henceforth to stand for self-possession, for dignity, for the assertion of the right of one nation to serve the other nations of the world — an emblem that will not condescend to be used for purposes of aggression and self-aggrandizement; that is too great to be debased by selfishness; that has vindicated its right to be honored by all nations of the world and feared by none who do righteousness.»

On 14 June 1916 President Wilson issued the «Flag Day» proclamation calling for a nation-wide Flag Day observance on 14 June.

FLAG OFFICER, in the navy of the United States, an officer who by his rank may carry a flag at the masthead instead of a pennant. Such officers are admirals, whose flags are carried at the main mast, vice-admirals, rear-admirals. Until the abolition of the grade commodores were flag officers.

FLAG OF THE PROPHET, the sacred banner of the Mohammedans, at first made of the white turbans of the Koreish, and later of the black curtain that hung before the tent of Ayesha. It was held in great honor at Damascus, and later fell to the caliphs of Bagdad. Amurath III brought the relic to Europe. The original has disappeared long since, but the populace still hold to the belief that the original banner is still in existence, and by them is held to be the most sacred relic of Islam.

FLAG OF TRUCE, a white flag carried by an officer sent to communicate with the enemy. The bearer cannot insist upon being admitted. He must always be admitted with great caution. Unnecessary frequency is carefully to be avoided. If the bearer of a flag of truce offer himself during an engagement, he can be admitted as a very rare exception only. It is no breach of good faith to retain such a flag of truce if admitted during the engagement. Firing is not required to cease on the appearance of a flag of truce in battle. If it be discovered, and fairly proved, that a flag of truce has been abused for surreptitiously obtaining military knowledge, the bearer of the flag thus abusing his sacred character is deemed a spy. See TRUCE.

FLAG OF THE UNITED STATES, The. Colonial Period (Part I).— Colonial Americans with hereditary instincts early manifested the inclination to symbolize local heraldic devices, in accord with the civic seals and tokens (see GREAT SEAL OF THE UNITED STATES) of the different colonies,— aside from the flags of the various mother countries to which they acknowledged allegiance,— Spain, Holland, England and France.

The first attempt to create flags came when banners were needed for the colonial military companies which were raised in 1747. Benjamin Franklin in his ‹Autobiography› relates that in 1747, when England was at war with Spain and attacked also by France, threatening a general intercolonial disturbance in America, he was among the first to note the unpreparedness of the English colonies to resist invasion or attack. He assisted in organizing military companies in Pennsylvania and awakened colonial interest in military preparations by his famous article entitled «Plain Truth» which was published throughout the colonies.

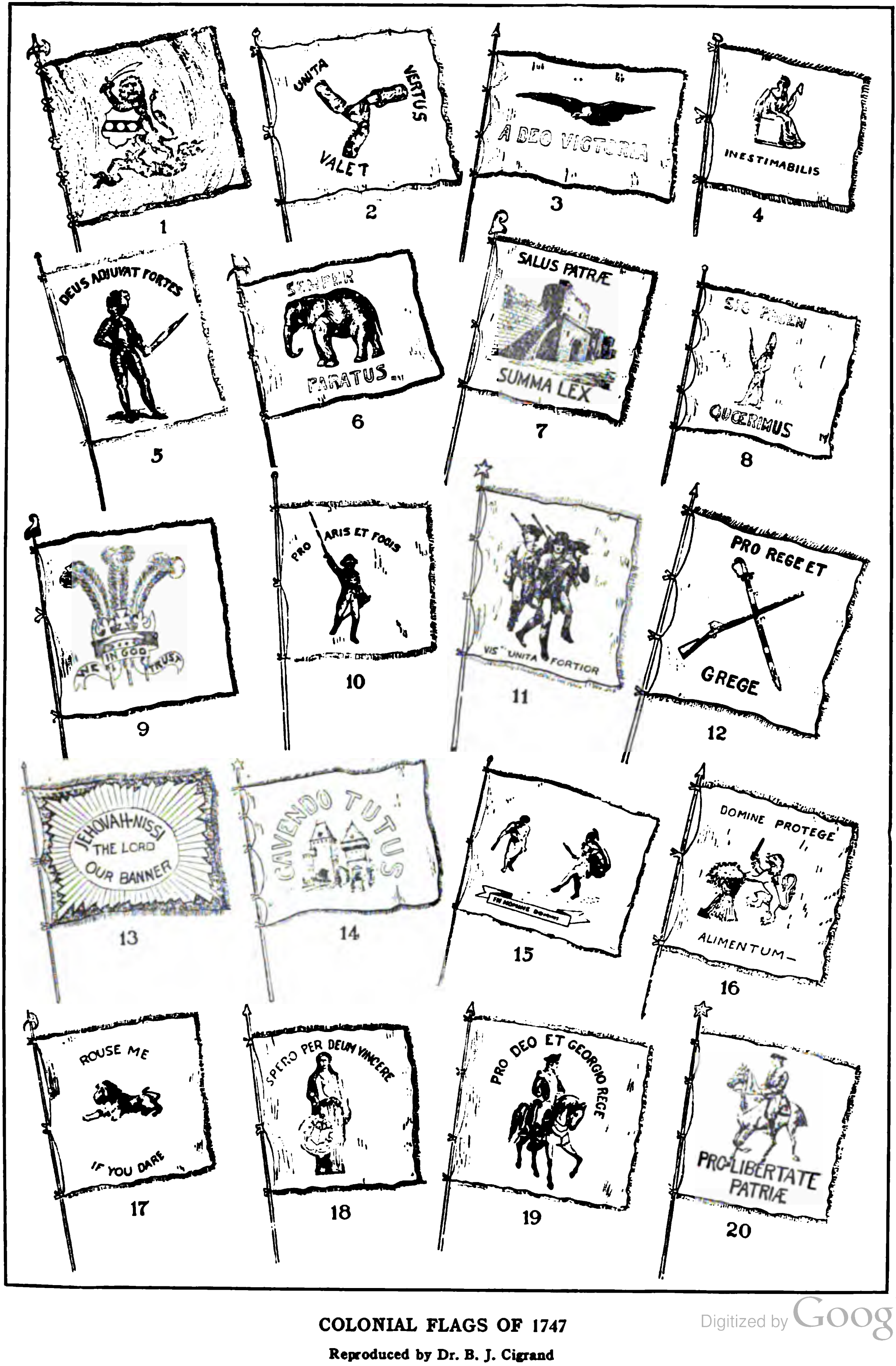
Besides organizing these military companies he further relates that he saw to it that «they furnished themselves as soon as they could with arms, formed themselves into companies and regiments, chose their own exercises and other parts of military discipline. The women, by subscription among themselves, provided 20 silk colors (banners or flags), which they presented to the companies, painted with different devices and mottoes, which I supplied.»

While in England representing the colonies he had devoted considerable time and effort in following the study of heraldry, and this art and science appealed to him throughout his entire life. To his many accomplishments he added that of being a skilful pen-artist, and the Philadelphians, evidently acquainted with Franklin's heraldic skill and artistic abilities, chose him to design the colonial banners. This is corroborated by Halley who conveys the following further interesting information: «The women furnished the respective corps with the requisite banners, which were handsomely emblazoned with bearings devised by Franklin, who was elected colonel of the Philadelphia regiment.» Curiously enough, no description of these flags was known, until a French transcription was discovered in Paris among literary material that had been omitted from the ‹Autobiography.› The following translation from the French gives us in Franklin's own words the description of these flags and was deciphered and reproduced after years of research by the writer:

1. Lion erect, a bared scimitar in one paw, the other holding the escutcheon of Pennsylvania. Motto: *Patria* (" Our Homeland ").

   While the impression is likely that the lion is representative of England, such is not the case. The arms are those of the Penn family and the lion refers to the same people, as the crest of William Penn was a demi-lion.
2. Three arms, dressed in various stuffs or cloth, gathered, smooth and striped, the hands grasping at the wrist, signifying the union of all classes. Motto: *Unita Virtus Valet* (" United in Virtue We Conquer ").
3. An eagle — emblematic of victory — descending from the sky. Motto: *A Deo Victoria* (" From God the Victory ").
4. The figure of Liberty seated upon a cube, holding a lance, upon the point the bonnet of Liberty. Motto: *Inestimabilis* (" The Incomparable ").
5. A man in armor with naked sword in hand. Motto: *Deus Adjuvat Fortes* (" God Aids the Brave ").
6. An elephant emblematic of the warrior always on the alert. This beast is said never to stretch out upon the earth, being always on his legs and ready for defense. Motto: *Semper Paratus* (" Ever Ready ").

   This motto is found on the arms of the family of Francis Hopkinson. The earliest instance of the elephant appearing in this idea as associated with America, occurs in the early coinage of the Carolinas. The elephant to-day is employed to symbolize the Republican party.
7. A city surrounded by ramparts. Motto: *Salus Patriae Summa Lex* (" The Safety of the Country the Highest Law ").
8. A soldier with his piece covered. Motto: *Sic Pacem Quaerimus* (" Thus We Seek Peace ").
9. A crown with plumes (or tufts). Motto: *In God We Trust*, the first use in America of this subsequently much discussed motto. Franklin changed the Black Prince's German motto " Ich Dien " "I serve" to " In God We Trust "— motto in English.
10. A man, with sword pointed heavenward. Motto: *Pro Aris et Focis* (" For Hearth and Home ").
11. Three members of an association marching with muskets on shoulders, clothed in various costumes, signifying the unanimity of the different peoples in the association. Motto: *Vis Unita Fortior* (" United Force Is Strength ").
12. A musket and sword crossed. Motto: *Pro Rege et Grege* (" For King and People ").
13. Representation of a glory, in the centre of which is inscribed *Jehovah Nissi* (" The Lord Our Banner ").
14. Feudal home, at door of which a soldier stands sentinel. Motto: *Cavendo Tutus* (" Safety in Preparedness ").
15. David advancing toward Goliath and hurling the stone from his sling. Motto: *In Nomine Domini* (" In the Name of the Lord ").
16. A lion, rampant, holding in his right paw a scimitar; in the other a sheaf of wheat. Motto: *Domine Protege Alimentum* (" Lord, Protect our Harvests ").
17. A sleeping lion. Motto: Rouse Me, If You Dare. Motto in English.
18. Hope represented by a standing woman, clothed in blue, holding in one of her hands the shield and device of an anchor. Motto: *Spero per Deum Vincere* (" Through God I Hope to Conquer").
19. The Duke of Cumberland as a general. Motto: *Pro Deo et Georgio Rege* (" For God and King George ").
20. A soldier on horseback. Motto: *Pro Libertate Patriae* (" For the Liberty of the Homeland ").



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COLONIAL FLAGS OF 1747

Reproduced by Dr. B. J. Cigrand

The flags were not only designed and produced, but were used at the drills as shown in *Pennsylvania Gazette* of 12 Dec.. 1747, which says: «A great body of soldiers met and marched to the court-house, with drums beating and colors flying — both the gifts of the women.» Historians of the past have completely overlooked these colonial flags and only after years of diligent search has the writer found and deciphered them.

In 1766 the Sons of Liberty of New York floated a flag above one of their meeting places with the words, «The King, Pitt and Liberty,» but the British soldiers took offense at the white cloth, and chopped down the flagstaff and disposed of the flag. The remark that it referred too lightly or slightingly to the king caused the «Sons» to hoist another with this change, «To His Most Gracious Majesty — William Pitt — and Liberty.» This, too, the British guards destroyed. Having been forbidden to hoist any but the British flag on public property, the Sons purchased a piece of land 100 feet by 11 feet and on a tall pine-tree-ship-mast, and at elaborate exercises hoisted a flag upon which was the single word, «Liberty.»

Four years later (1770) the Sons of Liberty of Boston hoisted upon a tall pine tree in a grove on Harvard Campus (at Washington and Essex streets) a plain red flag. This deviceless flag later was improved by sewing upon it a Green Pine Tree (used on Massachusetts coins in 1652) — majestic symbol of American liberty. It later played an important part in the American Revolution, introductory triumph at the battle of Bunker Hill. The colonies also had a flag in 1745 at the capture of Louisbourg, Sir William Pepperell, a native of Maine, furnished the motto. *Nil Desperandum Christo Duce*, meaning «Never Despair, Christ Leads.»

The flag of the New England colonies, used as early as 1737, had a blue field with a red cross quartering a white canton (or union) and in its first quartering it had a globe in token of the new world. Hence here was in reality the first use of red, white and blue as a flag of union in the colonies, and it is possible the committee which designed the Cambridge or Grand Union flag wished to retain the red, white and blue, hence with slight change approved of the tinctures. The earliest attempt to unite the New England colonies dates 1643. The New England honor flag (1686) in respect to the king was white quartered by a wide red cross; on the centre of cross, the initials J. R. (James Rex) with gold crown above.

Flags of the American Revolution Prior to Stars and Stripes (Part II).— Prior to the adoption of the Stars and Stripes, and before the acceptance of the Boston Flag, the colonies had a multiplicity of flags of various designs containing a great variety of devices. Not only did the respective colonies have these different flags, but (as already shown in Part I), regiments in the same colony had special banners, and even counties had their own standards. While this phase of the evolution of our flag might be interesting and instructive it would require a large volume to portray and describe those flags which antedated our present glorious flag — commonly and affectionately called the «Stars and Stripes.»

It has been thought by many and even recorded by writers that this was the first instance where 13 stripes were employed in the new world as a symbolism, but close research discloses that a number of flags contained this idea before the creation of the first Continental flag. In fact, when Washington was escorted from Philadelphia to Boston to take command of the troops, the guard of honor which accompanied him was the famous Philadelphia Light Horse, which carried a flag upon which was blazoned 13 stripes, alternate blue and white.

The uniqueness and logic of this 13-striped banner no doubt appealed to the Congressional Committee and it required no great change to make it adaptable to the new requirements in the civil strife with England. Just change the blue to red and they had the 13 stripes, alternate red and white. Nor was that the only prior flag which contained the 13 stripes, since we find that the East India Company in its colonial trade ambitions had a flag which had a red cross on a white union and 13 stripes, alternate red and white, and this standard was seen in American harbors from 1704 to 1834. This remarkable flag may be seen in The British Museum, and pictures of it in the fourth edition of J. Beaumont, Jr.'s book, 'The Present State of the Universe' (London 1704). It appears that the East India Company did not always float this flag, but in the 'Dominion and Laws of the Sea' (London 1705) the flag had but 10 stripes, five red and five white.

A Holland book on flags shows a colonial trade flag with 13 stripes, yellow and red; the date on the flag is 1738. This antedates our flag of 1775 by 37 years. A similar Holland flag of even earlier date can be seen in heraldic entry in the Paris Municipal Library in the volume entitled, 'La Connoissance Des Pavillons ou Bannières de La Plupart Des Nations,' published at La Haye in 1737. Then there is also the English flag called «Pavillon De Rang ou de Division d'escadre,» having 13 stripes, alternate red and white, a union argent (white) with red cross of Saint George, floated in 1736. A flag of North Holland had 13 stripes, alternate yellow and red, floated in 1736.

In the interest of truth we must enter this matter, even if it seems to set aside that the colonies were first to thus symbolize or that the idea of such striped flag had never existed before the Grand Union flag which was devised by the committee in the last days in December 1775, and hoisted and saluted by General Washington and his soldiers on 2 Jan. 1776. And in the south a flag of 13 stripes, alternate blue and red, with a serpent diagrammed bend dexter and the words above it «Don't Tread on Me,» also contained the emphatic idea of representating the colonies and employing the idea of the stripes. The same idea appeared in a southern flag of 13 stripes, alternate red and white.

Writers and speakers are mistaken when they state that the first raising of a starry flag in the new world was at the birth of the United States emblem. Rhode Island in 1776 and early 1777 had a blue flag with white stars; and Cortez had a flag with stars in a circle more than 200 years before. Hon. J. W. Foster, who saw this flag in the Mexico City Museum, says that the Cortez flag has 12 stars.

It came to the writer's notice while studying the writings of John Dryden, English poet (b. 9 Aug. 1631; d. 1 May 1700), that his lines well express our unity:

> "A constellation is but one
> Though it is a train of stars."

These lines were written near 100 years before our forefathers chose the constellation of stars as a symbol of unity and harmony. and Dryden's writings were well known to the colonists. The constellation idea also emphatically indicated that the stars were to travel by laws of concord and not each star for itself and independent or indifferent to its neighbors, but with a destiny of the entirety — a united, concerted body of stars or states. This was a wonderful conception; time has attested its truth and established the fact that the stars are not a mere collection, but a constellation, and represented a new ideal in political and governmental affairs. Charles J. Lukens has told it well in this poem:

> "Thirteen blazed at once in their new constellation
> The daughters of Freedom, a star for each mate;
> A new silver star is the fine augmentation
> Of honor they granted for every new State.
>
> As the Stars and the Stripes are our States interwoven
> Having grown thus from weakness to far spreading might
> Then perish the villain who, wanting them cloven,
> Would quench their resplendence in treachery's night".

Another favorite flag in the New England districts was a white field with a green pine tree in the middle with the motto: "An Appeal to Heaven." It was endorsed by the Massachusetts Council, which, in April 1776, passed a series of resolutions providing for the regulation of the sea service, among which was the following:

> "Resolved that the uniform of the officers be green and white, and that they furnish themselves accordingly, and that the colors be a white flag with a green pine tree and the inscription "An Appeal to Heaven."

In the Southern Colonies a blue flag with the word "LIBERTY" in large white (sometimes golden) letters waved over many a fort and battle. It was such a banner which Sergeant Jasper restored at the Sullivan fortress on 28 June 1776; the news of the victory was an added impulse to the signers of the Declaration of Independence.

The Washington Life Guard was organized in 1776, soon after the siege of Boston while the American army was encamped near New York. Its flag was said to have been in the museum at Alexandria, Va., which was burned soon after the Civil War began and nearly everything was lost. It was of white silk with the design painted on it. The uniform of the guard was as follows: blue coat with white facings, white waistcoat and breeches, with blue half gaiters, a cocked hat and white plume. Some authors give the American shield a place on this banner, but only a later design contained the shield, since the United States shield did not appear until 20 June 1782.

There was a flag which floated above the heads of the brave colonists on 19 April 1775, when they defied the British at Lexington and Concord, Massachusetts. That flag, known as the Bedford Flag, is on exhibition in that Massachusetts town. It is of maroon shade, and contained these words: *Aut Vince Morire,* meaning "Conquer or Die." It was carried by Nathaniel Page, captain of the Bedford Minute Men on that memorable and historic 19 April 1775.

The device of a rattlesnake was popular among the colonists, and its origin as an American emblem is a curious feature in our national history. It has been stated that its use grew out of a humorous suggestion made by a writer in Franklin's paper — the *Pennsylvania Gazette* — that, in return for the wrongs which England was forcing upon the colonists, a cargo of rattlesnakes should be sent to the mother country and "distributed in Saint James' Park, Spring Garden, and other places of pleasure."

Colonel Gadsden, one of the marine committee, presented to Congress, on 8 Feb. 1776, "an elegant standard, such as is to be used by the commander-in-chief of the American navy; being a yellow flag with a representation of a rattlesnake coiled for attack." The words "Don't Tread on Me" do not appear on this golden flag.

A blue flag with a union of white, upon which was a red cross with a pine tree in the upper dexter quarters, floated at the battle of Bunker Hill, 17 June 1775, and another flag of the same pattern, except that the flag was red and the cross red, was also used at Bunker Hill, and bore these inscriptions: On one side, "An Appeal to Heaven" and on the other "Qui Transtulit Sustinet," meaning, "He who transported will sustain."

These were beautiful flags and research shows that both colors were used.

Trumbull gives the red in his celebrated painting in the capitol at Washington and other authentic accounts show that the blue flag was carried also — the color being the only difference in the two.

Massachusetts banner, 1659, white, a hand holding a dagger, marked "Thre County Trom." was used.

Another New England flag of white had a pine tree and curled about its trunk a serpent, below which were the words "Don't Tread on Me"; above the tree, "An Appeal To Heaven."

The Crescent flag of 1776, a flag in blue with a white sign of the Crescent in upper dexter corner, was made by Col. William Moultrie, a Southern patriot. Another Crescent device flag had the word "Liberty," in white under the crescent also in white, on blue cloth.

Another flag bearing the symbol of a rattlesnake was the "Culpepper Minute Men," words which appeared across the top, while below were the words "Don't Tread on Me," and across the centre these words "Liberty or Death."

As early as 1754, 21 years before the battle of Lexington, Benjamin Franklin urged the colonies to unite. (He also advised it in 1747 and suggested flags, see Part I). In his paper the *Philadelphia Gazette,* that editorial was embellished by a wood-cut of a snake divided into 10 parts, with the initials of some of the various colonies, all New England forming one part — the head. The idea was also placed on some of the early banners and devices.

Then there were such other flags, as the White Plains banner, of white with a naked sword crossed by a pole upon which was a liberty cap. In ancient times when a slave was set free he was permitted to wear a blue cap to indicate that he had obtained his freedom, hence blue and a cap have been for centuries associated with liberty.

The Taunton flag was used early in our Revolution, and a design of the British flag with the word «Liberty» painted or sewed upon the flag.

The Newbury port design consisted of a green cloth, a white canton, with red cross. Also a circle of a 14-link chain with a green pine tree; at each link a hand holding the link represented that the 13 colonies were joined in a chain of union.

Early in the Revolution, John Hancock presented to a colored troop a flag upon which appeared a pine tree, and aside of it, a deer, above which the initials «G. W. and J. H.» are pictured. The letters refer to George Washington and John Hancock who presented the flag.

The Proctor flag consisted of a red ground with a rattlesnake in the attitude of striking at the Union Jack of Great Britain. Beneath the snake the words «Don't Tread on Me.» The initials J. P. 1 B. W. C. P. mean John Proctor, 1st Brigade, Westmoreland County, Pennsylvania. The original is at New Alexandria, Pa.

The *London Chronicle* (January 1776) states: «A captured Provincial cruiser had a flag of white — a pine tree; opposite side words, 'An Appeal to Heaven.'»

A Martinique harbor entry (September 1776) states that an «American Continental brig, *Reprisal,* floats a flag of 13 stripes of white and yellow.»

The London artist, Thomas Hart, on 22 Aug. 1776 drew a picture of an American vessel having a white flag with words «An Appeal to God» under a tree; above tree, words «Liberty Tree.»

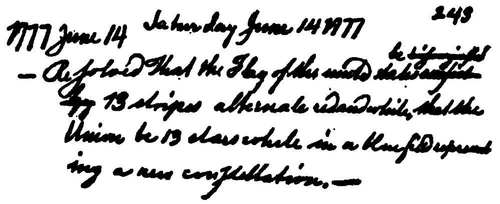
There were also a few anti-religious flags — and some few anti-creed banners, but they were the outgrowth of groups of people, rather than the action or authorized action on the part of civil authorities or representative assemblies.

In the latter part of 1775 the Continental Congress, knowing the necessity for a continental flag, appointed a committee composed of Benjamin Franklin (Pennsylvania), Benjamin Harrison (Virginia), and Mr. Thomas Lynch (South Carolina). This committee journeyed to Boston and there conferred with Gen. George Washington and other leaders of the rebellion, as it was then called by both the colonists and the English. But some of the distinguished advocates of self-defense were not so outspoken as to rebellion; and even separation from England was not the commonly accepted idea that prevailed. In fact the idea of a new and opposing flag was not entertained by even General Washington, who rather at that time had great hopes of reconciliation and felt that England would soon see the folly of her oppressive measures and grant the colonies what they desired and all would soon be restored to peace. But when the conference committee which also had the flag problem in charge landed in Boston 13 Dec. 1775, there was considerable discussion, much of it of a heated character. The committee finally decided that a flag should be devised which should contain symbolisms of loyalty to the mother country, but should also contain a rather bold element which would typify that the colonies were united and that union or combination of military strength be a prominent feature in the flag. The deliberation devised such a combination and the union of that flag contained the crosses of Saint George and Saint Andrew on a blue field; and the 13 colonies were indicated by 13 stripes, alternate red and white.

Writers and speakers have in the past accepted Martin Tupper's (English poet) suggestion made in 1850, that the American flag with its stripes and stars was evolved from the Washington coat-of-arms, but careful search now shows that the stripes as well as the stars were prominently blazoned on colonial and continental flags before George Washington figured in the flag-creating proposition. It's a mere coincidence that these devices are somewhat similar.

The National or «United States Flag» (Part III).— The gradual merging of the colonies into a spirit of national importance, together with the unexpected military triumphs begot the idea that a mere confederated standard as the Grand Union flag,— raised by General Washington at Cambridge on 2 Jan. 1776 — had outlived its symbolism. That flag contained 13 stripes, alternate red and white, but its union of the crosses of Saints George and Andrew, strictly British emblems, were not in good favor now, and hence a committee, composed of Gen. George Washington, Robert Morris and Col. George Ross, was instructed by the Continental Congress to devise and produce a flag for the United States of North America. The committee, with the aid of Mrs. Elizabeth Ross, evolved the basic idea of the present flag of the United States. The adoption of the Declaration of Independence of July 1776, prompted the delegates to see that a national Seal be designed at once, (see GREAT SEAL OF THE UNITED STATES)— while the national flag was not acted upon for upwards of 10 months later and adopted, as suggested by Washington, Morris and Ross, on 14 June 1777. Hence the Grand Union or Cambridge flag was the Continental emblem from 2 Jan. 1776 until 14 June 1777, when the Continental Congress made the Stars and Stripes the standard of the United States. In fact they fought under that Boston flag until 2 Aug. 1777, when a «hurry up» or «home made» Stars and Stripes was improvised and floated over Fort Schuyler at Rome, N. Y. The soldier who was among the flag producers was Col. Marinus Willett, and his story is in part supported by other members of the fort, as well as by a recently disclosed letter in England, in which the British soldier refers to a banner: «Over the Fort Stanwix built by us in 1758 and named after the brave General Stanwix, they (the continentals) hoisted a flag of white and red stripes and on a canton of azure there were white stars.» The garrison decided to form the national standard, but being away from stores, clothshops or homes, and being hemmed in by the British, the task arose, how shall this emblem of unity be constructed? Here is where Colonel Willett's diary and narrative comes to the surface with the facts, and reads as follows: «The fort (Fort Stanwix) had never been supplied with a flag. The necessity of having one had, upon the arrival of the enemy, taxed the invention of the garrison a little; and a decent one was soon contrived. The white stripes were cut out of an ammunition shirt; the blue out of the camlet cloak taken from the enemy at Peekskill, while the red stripes were made of different pieces of stuff procured from one and another of the garrison.» Another witness of the garrison states in his letters home that «The blue ground for the stars was composed of a cloth cloak belonging to Captain Abraham Swartout of Dutchess County.» The captain, hence, wore the camlet cloak taken from the British at Peekskill battle. See Ross FAMILY.

Things original are always sought after and it will certainly be gratifying to Americans to see the original resolution which gave birth to our national flag. The State Department furnishes the actual photograph copy of this greatest sentence in the history of the United States; and we reproduce it with its corrections. This gives the reader the exact entry on the record pages of the Continental Congresses, and reads:



1777 June 14 Saturday June 14 1777 243

[illegible]

— Resolved That the Flag of the united States [illegible] 13 stripes alternate red and white, that the Union be 13 stars white in a blue field representing a new constellation. —

The original resolution creating the flag of the United States.

The question is often asked what was intended by the words «a new constellation,» and had it any reference to any particular heavenly group of stars. It may be stated that the constellation Lyra, known as the harmony or unity group, was intended as its complement in the sky. John Adams was for a period chairman of the Continental Board of War, and he left a tradition in his family that the constellation Lyra was intended, and his son John Quincy Adams, when Secretary of State in 1820, had a seal made for passports which had the American eagle holding in his beak the constellation Lyra, the entirety surrounded by 13 stars representing the colonies. Charles Francis Adams, grandson of John Adams, also confirms the tradition and brings correspondence of his distinguished sire to prove the item. And it was proposed that the blue union of our flag have the symbolic Lyra, but it was not accepted, as the idea of the stars in a circle seemed more beautiful and could mean as the Lyra constellation, harmony and purity, without the exact irregular location of stars and the emblem — Lyra.

While the creative resolution does not specify just what the arrangement of those stars should be, yet it was left to the will of the executive departments to agree upon some plan. The earliest flags always displayed these heavenly bodies in a circle, though there were many revolutionary flags which arranged them otherwise.

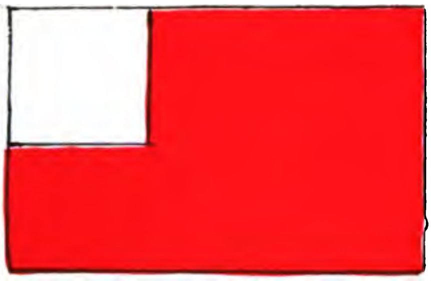
But on 26 Oct. 1912 the executive order of President William H. Taft was made concerning the specific location of the stars and their definite representations; they were to be arranged in six rows of eight stars each, the stars to symbolize the States in the order of the States' ratification of the United States Constitution, viz., Delaware, Pennsylvania, New Jersey, Georgia, Connecticut, Massachusetts, Maryland, South Carolina, New Hampshire, Virginia, New York, North Carolina, Rhode Island, Vermont, Kentucky, Tennessee, Ohio, Louisiana, Indiana, Mississippi, Illinois, Alabama, Maine, Missouri, Arkansas, Michigan, Florida, Texas, Iowa, Wisconsin, California, Minnesota, Oregon, Kansas, West Virginia, Nevada, Nebraska, Colorado, North Dakota, South Dakota, Montana, Washington, Idaho, Wyoming, Utah, Oklahoma, New Mexico, Arizona.

On the admission of Vermont in 1791, the citizens complained that their new State was not represented in the flag in either star or stripe. Then in 1792 Kentucky also joined the Union, and she, like Vermont, was not symbolized with the star or stripe, and so it can be said that these two States were without heraldic representation on the National flag until May 1795 when Congress ordered: «That from and after the first day of May 1795 the flag of the United States be 15 stripes, alternate red and white; and that the union be 15 stars, white in a blue field.»

But this did not solve the problem of flag standardization, for in 1796 Tennessee came into the Union and wished a star and a stripe, as did also Ohio in 1802; Louisiana in 1812; Indiana in 1816; Mississippi in 1817; and Illinois in 1818. And it was the latter, Illinois, which would not be stilled, and she insisted that her star or stripe, or both, must come into heraldic significance, and so Congress, on 4 April 1818, ordered: «That from and after the fourth day of July next, the flag of the United States be 13 horizontal stripes, alternate red and white; that the union have 20 stars, white in a blue field.» And the Illinois, or 21st star, legally went into the flag, 4 July 1819.

Congress, in three basic laws, has always referred to our National flag as «The Flag of the United States,» and, strictly speaking, the designation «The American Flag» is wrong, as there does not legally exist such an emblem, but there is a Flag of The United States, as decreed in the law of 14 June 1777, 1 May 1795 and 4 April 1818. On 9 Sept. 1776 Congress ordered that the words «United States» be used where heretofore the words «United Colonies» were used.

And so Tennessee, Ohio, Louisiana, Indiana, Mississippi and Illinois were for sometime without symbols on the flag, and in order that all new States in the future would not pester Congress for a star and a stripe, Section 2 of the order or bill which became a law in 1818, provided: «That on the admission of every new State into the Union, one star be added to the union of the flag; and that such addition shall take effect on the fourth of July next succeeding such admission.» (Approved 4 April 1818.) Hence on 4 April 1818, the third and last law establishing the creation of our National flag was instituted. The legal name for our emblematic cloth is «The Flag of United States»; permissible terms, «The American Flag,» «Our National Flag,». «The Star Spangled Banner,» «Stars and Stripes,» «Old Glory» and «Flag of the Free,» «Stripes and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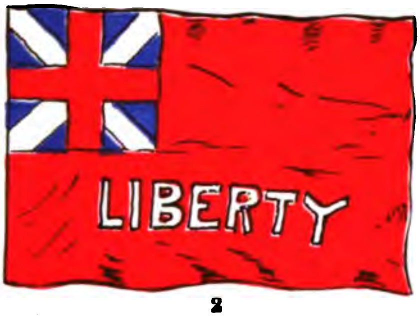

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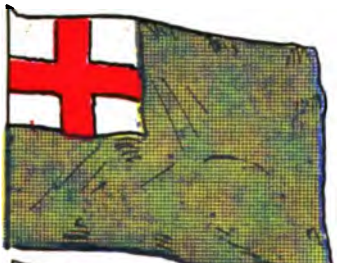
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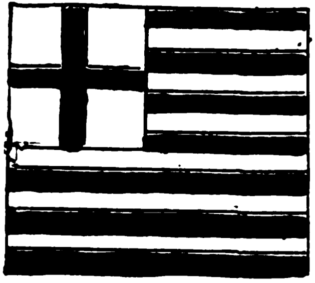
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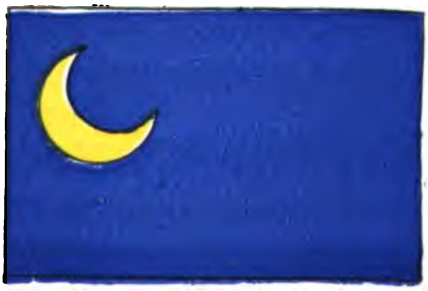
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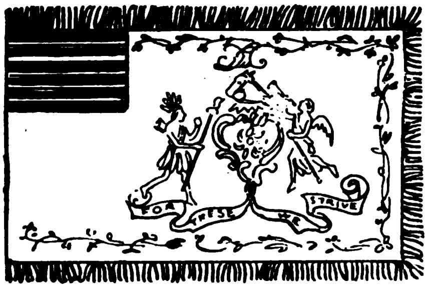

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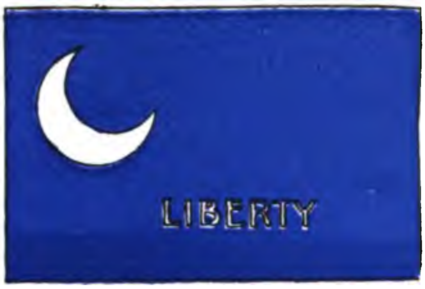

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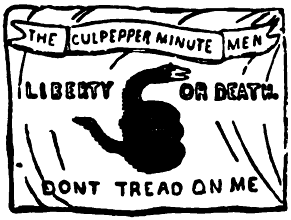

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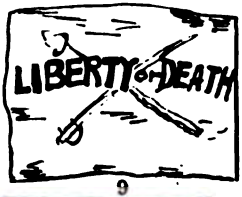

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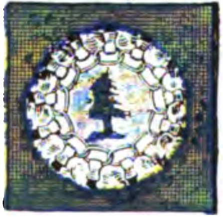
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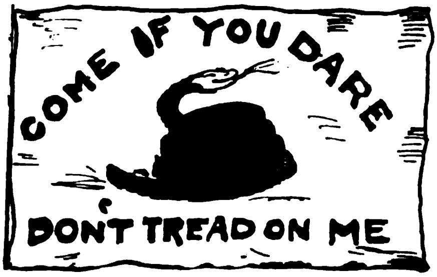

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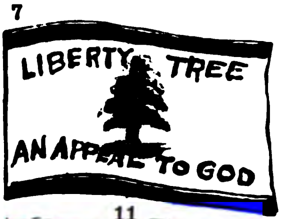

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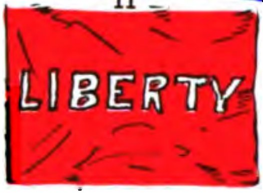

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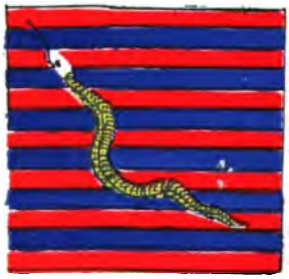
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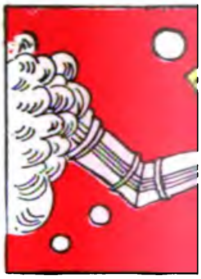

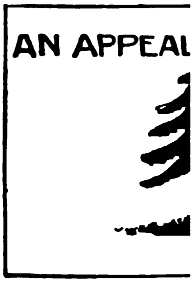

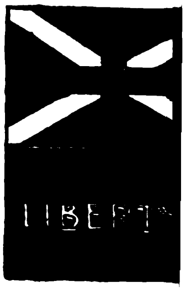

EVOLUTION OF THE UNITED STATES

1 New England, 1772
2 Taunton, 1774
3 Newbury, 1774

4 East India, 1706
5 Col. Moultrie, 1775
6 Philadelphia, 1774
7 Fort Sullivan, 1776

8, 9 Virginia
10 Sons of Liberty, Pennsylvania
11 Minute Men, 1775
12 Sons of Liberty, New York

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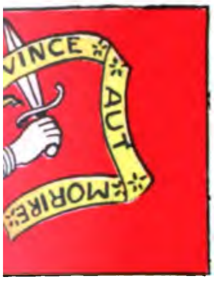

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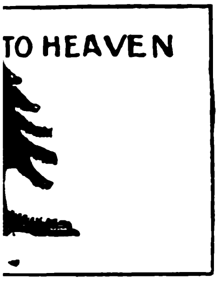

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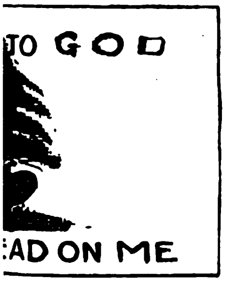

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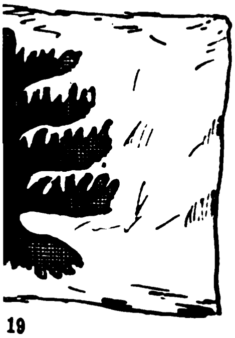

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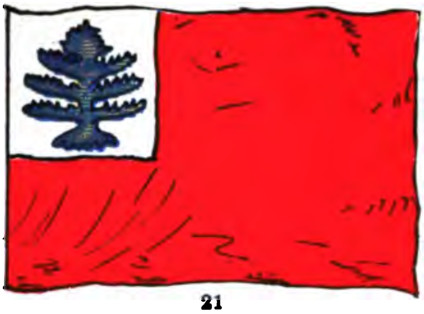

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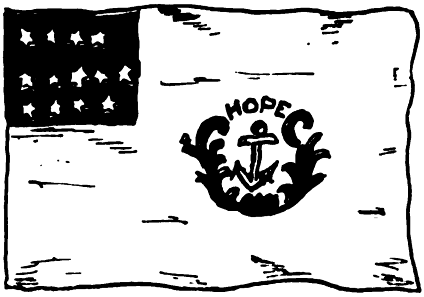

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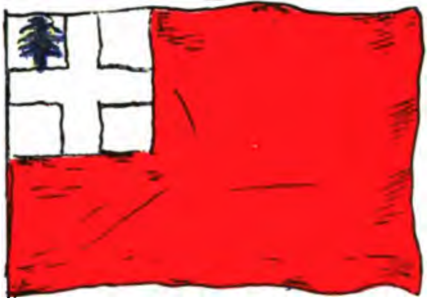

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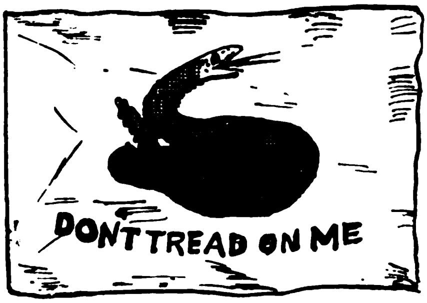

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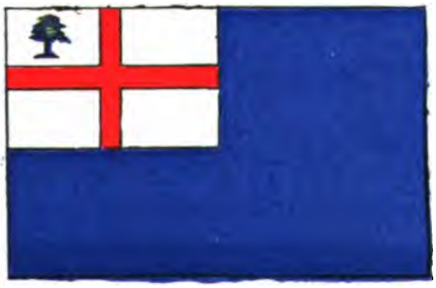

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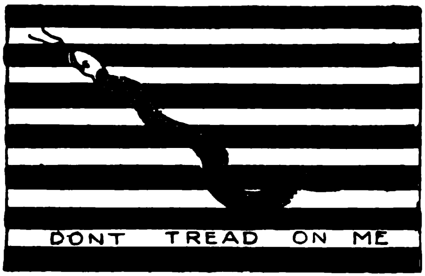

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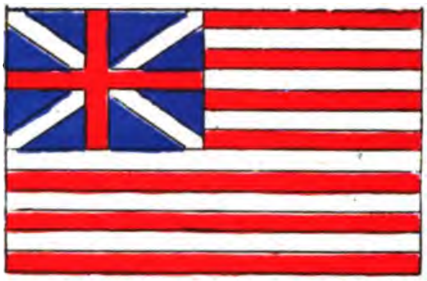

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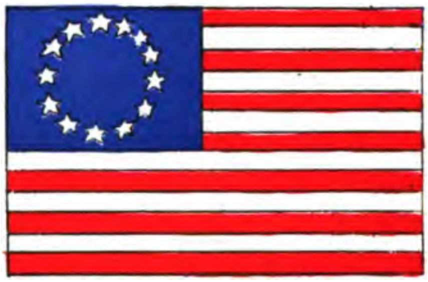

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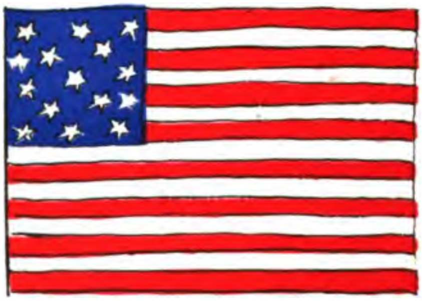

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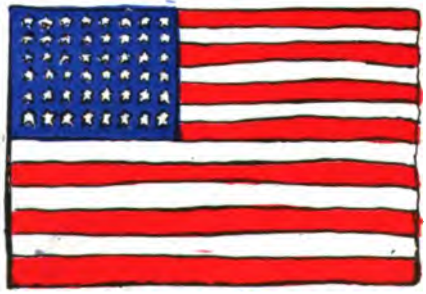


30

IG. Designed by Lieut. B. J. Cigrand, U. S. N.

23	South Carolina
14	Pennsylvania device, 1776
16	Lexington-Concord, 1775
17	Continental Navy, 1776
18, 19, 20, 22	New England, 1775
21, 23, 25	Bunker Hill, 1775
24	Col. Gadsden, 1776
26	Virginia, 1776
27	Union Flag, 1776
28	United States, June 14, 1777
29	United States Flag, 1795
30	Present United States Flag

Stars» — as the stripes came before the stars, by 17½ months. In the army it is called «Standard,» while in the navy it is known as «Ensign.»

First Salute to the Stars and Stripes.— On the same page upon which on 14 June 1777 appears the resolution creating our flag, also appears by a strange coincidence, the appointment of Paul Jones, Captain of the American Navy. This coincidence led the young officer, who was later to achieve such marked success for the American Navy in the cause of liberty, to declare:

> "That flag and I are twins, born the same hour and the same day out of the womb of destiny. We cannot be parted in life or in death. So long as we can float we shall float together. If we must sink we shall go down as one."

At Portsmouth, N. H., three weeks later, on the first anniversary of the Declaration of Independence, Jones hoisted the flag to the peak of the *Ranger,*— the first time the Stars and Stripes ever floated from an American man-of-war. In November 1777, the *Ranger* left American shores to carry to France the despatches announcing the surrender of Burgoyne at Saratoga. Upon his arrival, in February 1778, Jones sent the following letter to William Carmichael, secretary to the commissioners who were sent to France to arrange the treaty of alliance between the French government and the colonies:

> "*Ranger*, 13 Feb. 1778, Off Quiberon.
>
> "My Dear Sir:
>
> "You will confer a singular obligation upon me by presenting my respects to the French Admiral, whom I mean to salute with 13 guns under American Colors — provided he will accept the Compliment and return Gun for Gun. This proposal I hope will be the more acceptable to him as it may be a prelude to future amity between the United States and his Court.
>
> "I shall be happy to see you here as soon as possible after you have the Admiral's answer. Meantime pray excuse this trouble — I am my dear Sir with sentiments of esteem and Respect
>
> "Your very Obliged
> "Very Obedient
> "Most humble Servant
> "Jno. P. Jones."

The salute thus arranged was fired on Saturday evening, 14 February, and was repeated on the morning of Sunday the 15th. Dr. Ezra Green, at that time a surgeon on the *Ranger,* thus referred to the event in his diary:

> "Sat. 14 Feb. 1778. Very squally weather; came to sail at 4 P.M.; saluted the French Admiral and received 9 guns in return. This is the first salute ever paid the American flag." See JONES, JOHN PAUL.

A New Flag for Every War.— In every war since the creation of our flag, on 14 June 1777, it has had a different arrangement of either stars or stripes, or both. While the basic elements are alike, the design is different.

Flag of Revolution, 1777 — *First War with England.*

Thirteen white stars in a circle in a blue field; seven red stripes and six white stripes.

Flag of War 1812 — *Second War with England.*

Fifteen white stars in a blue field; Eight red stripes and seven white stripes.

War with Mexico (1846).

Twenty-nine white stars in a blue field; Seven red stripes and six white stripes.

Civil War of 1861.

Eleven States declared that their stars were taken out of the Union, but Lincoln left them in the Flag making 34 white stars in a blue field; seven red and six white stripes. Before the war closed two new stars were added to represent West Virginia and Nevada.

War with Spain (1898).

Forty-five stars in white on a blue field; seven red and six white stripes.

War with Germany, or World's War (1917–18).

In a field of blue are 48 white stars. Seven red and six white stripes. The proportion of the flag has been improved in that the flag is now a trifle longer and not so wide.

Initial Events of Stars and Stripes.— The earliest request for a United States flag occurs in the recommendation of the Continental Congress of 3 June 1777, in which document appear these lines:

> "The President laid before the council three (3) strings of wampum which have been delivered to him some time before by Thomas Green, a nominal Indian of the nation, requesting that a flag of the United States might be delivered to him to take to the chiefs of the nation, to be used by them for their security and protection, etc."

This request from the Indians may have been the very item which induced Congress to provide a flag of the United States. The first starry emblem was made by Mrs. Elizabeth Ross in Philadelphia in 1777.

The National flag was adopted 14 June 1777 and the first salute to the Stars and Stripes came on 14 Feb. 1778, at Quiberon Bay, France, when the French admiral, La Motte Piquet, gave his recognition to the flag on the *Ranger,* commanded by Capt. Paul Jones. The starry emblem was first carried around the world on a ship happily called *Columbia,* which left Boston 30 Sept. 1787, returning to Boston 10 Aug. 1790. And on 11 May 1792 the same ship and flag sailed up the scenic stream of the northwest and called it the Columbia River. An improvised earliest Stars and Stripes was made and hoisted at Fort Schuyler on 2 Aug. 1777. Our flag was first to ride the Atlantic wave 1 Nov. 1777, when Paul Jones left the harbor to carry the news to France that «Burgoyne has surrendered.» On 11 Sept. 1777, the flag went into battle, and its terrific attack at the Brandywine was a bloody baptism. Capt. William Moores raised the flag in London, 3 Feb. 1783, on his ship the *Bradford.* Its first engagement in battle on land in the old world was at Londonderry, Ireland, when our soldiers defended an American, Engineer Lemuel Cox, who was building a bridge of «American Oak» over the Foyle River. This skirmish took place 22 Nov. 1790. The English first saluted the Stars and Stripes on 2 May 1791, when Capt. Isaac Coffin of the British man-of-war *Alligator,* gave it 13 guns, and the guns from the shore responded to that kindness. New York city was the last city to be permitted to salute the Stars and Stripes, as the British were in control until 25 Nov. 1783, but at 3 o'clock P.M. of that day the Americans took possession and the flag was hoisted and cheered. The flag was carried to the Holy Land in 1848, by Lieutenant Lynch. The first American flag manufactured from American material was hoisted over the Capitol at Washington 24 July 1866; English bunting having been previously used. Gen. Benj. F. Butler donated the flag.

Most people believe that the patriotic custom of placing a flagpole on the schools and floating the flag during the school hours is of recent date, but in May 1812, at Colrain, Mass., on Catamount Hill, a flag-raising program was carried out on the school grounds where a newly chopped pine tree served as the Liberty Pole. Three of the men who helped to rear the natural staff were shortly afterward enlisted in the second war with England, giving the occasion a most patriotic atmosphere

Respect or Reverence for The Flag.— The flag, like the cross, is sacred. Many people employ the words or term «Etiquette of the Flag.» This expression is too weak, too superficial and smacks of drawing-room politeness. The rules and regulations relative to human attitude toward national standards use strong, expressive words, as, «Service to the Flag,» «Respect for the Flag,» «Reverence for the Flag,» «Devotion to the Flag,» «Behavior Towards the Flag.»

For centuries the flags of nations have been saluted by individual and organized civic or military bodies. In the United States the salute with right hand, while the person stands at attention, is the common and accepted method. The uncovering of the head is also recognized as a salute. Placing hat above the heart or hand on left breast is also esteemed reverential.

Pledges of allegiance offered to flags are of antiquity, and the British government exacted a form of loyal expression of our colonies in particular. Our nation has been slow to adopt any definite pledge aside from an oath of allegiance, but the change the writer made, in 1898, gives the pledge a definite and distinct expression, as binding as an oath and leaves no doubt in the mind of either the listener or speaker that the pledge is to the American Flag and not my flag; this version is accepted by State superintendents of instruction, boards of education and civic societies and lodges.

The important word capitalized, impress the allegiance and it reads:

> "I pledge allegiance to the AMERICAN FLAG,
> and to the REPUBLIC for which it stands:
> One NATION, indivisible, with LIBERTY and
> JUSTICE for all."

Meaning of the Colors.— The three elemental tinctures Red, White and Blue, have a definite meaning. The Continental Congress has (see GREAT SEAL OF THE UNITED STATES) bequeathed the following actual definition, as the writer found in 1889:

> White signifies Purity and Innocence;
> Red, Hardiness and Valor;
> Blue signifies Vigilance, Perseverance
> and Justice.

The foregoing sentence, designating the meaning of white, red and blue, sets aside all guess-work or unnecessary calculation; it is explicit, definite and expressive.

Positions for the Colors.— In the United States and her possessions, the American flag always goes to the right of all flags, foreign or domestic. Even in the parade at the inauguration of a governor, the State flag is to the left of the Star Spangled Banner In memorial or funeral parades the flag may be either dipped, or dropped forward or may have a shroud tied about it as it is wrapped about the staff. While in military or civic parades it should be held on a staff raised at more than 45 degrees and on the staff may float beneath the flag a pennant denominating the character of the regiment or division.

Dimensions of Original Representative American Flag.— Length, 12 feet; width, 7 feet 4 inches; width of each stripe, 6¾ inches; stars, 3½ inches from centre to points; blue field, 47¼ inches wide, 60 inches long; two one-half inch blue field between point of star, outside line of flag; 1¾ inch canvas binding.

Use of the Flag.— In order that a flag may be printed in printers' black ink, and still indicate the tinctures or colors it possesses, heralds of modern times have devised a simple yet perfect system which aids us in the study of national flags.

> Horizontal lines indicate blue or azure.
> Plain surface, without any marks, is white or argent,
> Perpendicular lines indicate red or gules.
> Dotted or spotted indicates yellow, gold or or.
> Lines crossing indicate black or sable.
> Lines from right indicate green or vert.
> Lines from left indicate purple.
> The right side of the shield is on the viewer's left.

In their regular heraldic order with heraldic terms, they are white, argent; yellow, or; red, gules; blue, azure; black, sable; green, vert; and purpure, purple.

The National flag should not be used as a red flag of danger; as a warning to automobiles at crossings, or at danger spots in the street or roadway. The American flag is not a token of «danger,» it is rather a «sign of safety.»

In bad or stormy weather it is considered unkind to permit the flag to fly. Use a smaller and less costly one for such weather if you feel you must, because of the occasion, fly your colors. The only place where in times of peace the flag may float all night is at the grave of Francis Scott Key, to make always true his famous lines: «Gave proof through the night that our flag was still there.» In battle it may wave night and day. The flag may float over the House or Senate as long as they are in session.

The flag which Key wrote about floated at the Fort McHenry, Baltimore. It was 30 feet square, had 15 stars and 15 stripes; the stars measured two feet from point to point. This same flag is government property and he wrote the poem while the battle was raging, 13 Sept. 1814. (See FRANCIS SCOTT KEY). Key's poem 'The Star Spangled Banner' is the National anthem, made so by executive orders from the Navy and War Departments. The song, 'The Red, White and Blue,' by Thomas Becket of Philadelphia, in another popular tribute to our colors. The poem, 'The American Flag,' classic picture of its purpose, was written by Joseph Rodman Drake in 1819. 'The Flag of Our Union' was written in 1851 by George P. Morris, journalist. Later poetic contributions are 'The Flag Goes By,' by Henry H. Bennett, and 'My Flag and Your Flag,' by Wilber Nesbit. While the most popular march composed in honor of the flag comes from Lieut. John Philip Sousa, entitled 'The Stars and Stripes Forever.'

The one hundredth anniversary of the birth of the American flag was observed on 14 June 1877 in Philadelphia and Boston. See FLAG DAY.

Whenever the Speaker of the House of Representatives or the Vice-President of the United States, presiding officer of the Senate, call these legislative bodies to order the American flag is hoisted above their halls, as a sign that these bodies are in session. Upon the adjournment of either, their respective flags are lowered.

The National salute to the flag requires one gun for every star.

According to naval regulations on the Potomac River, on all vessels passing the tomb of

Washington, the flag is lowered to half mast, and the bugler sounds taps, guards present, officers salute.

Few people seem to comprehend the exact outline and subordinaries of the shield of the United States. Stores with their profuse decorations at holiday times never have it correct and store windows can and should be made educational. Our shield does not contain Stars. It is a blue chief (on top) and the pales or stripes below are red and white; but these 13 pales are seven white and six red, while on the flag there are seven red and six white stripes.

The only emblem which is permitted above our flag is the sign of the cross and this only during community, army, navy or congregational prayer; and in the midst of devotional service. Every battleship carries this Christian flag and the new regulation demands that this «White Pennant with blue Cross,» float above the Stars and Stripes for one hour every Sunday — and placed at stern. The navy and marine bands at this religious function play «Onward Christian Soldiers,» closing with the national anthem.

Tassels, which are often pendent from tip of flagstaff, come to us from ancient times and are symbolizers that the banner is of sacred history. To those flags which had been in actual battle and had returned with victory or under which great heroism was displayed, the authorities in public ceremonials often attach the tassels as marks of distinction. In modern times the tassel has less important significance, though tassels should be granted to flags which are in actual army or navy service or have had or will have a memorable career. The same is true of the fringe on flags. It, too, had a similar distinguishing meaning.

While we frequently speak and write of our tri-color, strictly it is but a bi-color, as white is argent and supposed to represent silver in heraldry. The blue in our chief is of highest tincture, considered the superlative, and hence neither in the flag nor shield should it be at the bottom or hung upside down. Hence, in streamer cloth decorations, the blue should be at top, the white next, the red below. And when the blue bunting or streamers contain stars, the blue with the stars belong at the zenith or top.

This same blue «streamer bunting» is often used to decorate vehicles and the commonest sight is to see it bound or wound about the spokes and even the tires; this is emphatically unpatriotic as at every revolution of the wheels the colors are crushed through the dirt and dust. Decorate the machines, wagons, buggies and carriages, but in a manner that will protect the national tints from being dragged through the mud or slopped in any soiling material. When you wear the flag as an emblem on your coat, waist or shirt, see to it that no other token is pinned above the flag, otherwise it will show one of two things, either you have purposely disregarded the flag or that you are ignorant of heraldic or patriotic usages.

The stars on flags are often misplaced and too often are put on upside down. A star to be right must have one point directed to the zenith. Even when stars are in a circle every star must have one point to zenith. Expensive flags sometimes have the stars in gold; this is wrong, our stars are always white, or in heraldic langauge, argent or silver.

Whence the Name of «Old Glory.»—At the outbreak of the Civil War, there lived a man at Nashville, Tenn., who in his eagerness to preserve an American flag, which had been presented to him for a brave act while in the navy, had it safely concealed in a bedquilt. To his family and trustworthy Federal friends he said: «The north will save the Union, and I will yet see my old flag — 'Old Glory' — floating from the flagstaff of the State house of this city.» His prediction came true, for when General Buell captured the town this same old faithful patriot, Stephen Driver, took his flag from its hiding place, brought it to the Federal general and it was hoisted on the staff of the capitol building of Tennessee, while the old man shouted to the happy throng: «There once again floats Old Glory.»

The Department of Justice has issued a warning against the desecration of the American flag by aliens, in the following words:

> "Any alien enemy tearing down, mutilating, abusing or desecrating the United States flag in any way will be regarded as a danger to the public peace or safety within the meaning of regulation 12 of the proclamation of the President, issued 6 April 1917, and will be subject to summary arrest and punishment."

In the meaning of the Federal law regarding the use of flags in connection with trade-marks it has been determined that the flag must not be used in connection with advertising matter of any kind. This applies equally to the coat-of-arms of the United States (see GREAT SEAL OF THE UNITED STATES). It does not, however, apply to the use of the colors, red, white and blue, concerning which there are no statutes.

The Post-Office Department does not object to the use of envelopes bearing pictures of the flag, when placed upon the back of the envelope. When on the face of the envelope in most cases the stamp cannot be canceled, nor the letter postmarked, without defacing the flag.

Sub-ordinary United States Flags (Part IV).— Next to the United States flag — the official flag of the President merits the greatest respect. The President's flag is blue or azure with four white stars, one in each corner of the flag, and in the centre appears in proper heraldic tinctures the President's official seal, which is strikingly like the Great Seal of the United States, and hence many writers and speakers have pronounced it the national Coat of Arms. This difference however exists between the two designs: On the Great Seal (see GREAT SEAL OF THE UNITED STATES) the 13 stars are argent, arranged over the eagle's head so as to form one large star, while on the President's device nine stars arch across the eagle's head and the other four stars are on the dexter side of the eagle's beak; the President's device has a glory breaking back of the eagle and the streams illuminate the stars and clouds which hover over the stars; the clouds in the Great Seal are made as 13 and encircle the group of stars; the motto «E Pluribus Unum» on the National Seal is placed in a double streamer ribbon, on the dexter stream the words «E Pluribus»— while on the sinister one, the word «Unum» appears, the eagle beak holding the streamers at centre. When the President visits a vessel of the United

States his official flag is broken at the main, as he steps upon the deck of the ship, and remains so until he leaves the boat. It is also expected as this flag is unfurled to have a salute of 21 guns; and when the President departs a similar salute is fired, the last shot as the flag is gathered in. When the President visits on land and makes a hotel, summer home or camp his personal headquarters, his flag is floated from sunrise to sunset. His flag is one of the most difficult and handsome emblems ever constructed; made of silk and embroidered, involving expert needlework, it is considered the most gorgeous design in our national heraldry.

The flag of the Secretary of the Navy is blue or azure with four white stars, one in each corner and in the centre of the flag the “Anchor of Hope,” that early device of the United States navy.

The Assistant Secretary of the Navy has a flag of white or argent, four blue stars, one in each corner and an anchor in azure.

The flag of the Secretary of War is a later conception and consists of red silk with four white stars, one in each corner, and in the centre of the flag, and in proper heraldic tinctures the exact device known as the Great Seal of the United States. His flag has a narrow white border.

The flag of the Assistant Secretary of War is white with four red stars, one in each corner of the flag, and in the centre in proper heraldic tinctures the Great Seal of the United States. His flag has a narrow red border.

The flag of the United States infantry is blue with the Great Seal of the United States in proper tinctures, and beneath that device a red scroll with the words “United States Infantry” in white; this flag has a narrow yellow border.

The flag of the coast artillery is red with the Great Seal of the United States in proper tinctures; beneath two cannons crossed; below which, a yellow scroll with these words in red, “United States Coast Corps Artillery”; the border is yellow.

The flag of the Chief of Staff is half red and white, the division being on a bias, the upper triangle or pole side being red with a white star in the upper corner and the float end triangle white with a red star in lower corner; in centre of entirety on a large white star appears the Great Seal of the United States and in heraldic tinctures; the border is narrow and yellow.

The flag of the engineer corps is red with Great Seal of United States in centre, beneath which the symbol of the fortress, below which on a white scroll are the words in red “First United States Engineers”; the border is narrow and white.

The Secretary of the United States Treasury flag is blue with two white anchors crossed and entirety surrounded by 13 white stars. This flag is flown when the secretary is on board vessels in the treasury service, he being the commander-in-chief of the Coast Guard and Public Health service.

The flag of Assistant Secretary of the Treasury is same as foregoing except the flag is white and devices in blue.

The Secretary of Commerce flag is blue with four white stars, one in each corner; with a shield in centre displaying at chief a vessel in blue at full sail, in base a lighthouse as a beacon light in blue.

The Assistant Secretary of Commerce same as foregoing except flag white with shield blue and charged device white.

The United States custom flag is of 16 stripes or pales alternate red and white, as a union an American eagle in blue, on its breast the United States shield and 13 stars arched over all; the eagle's left talon holds three arrows; the right talon an olive branch.

The Secretary of Labor flag is white with four blue stars, one in each corner and in centre his department seal which consists of a shield possessing the plow, above shield the American eagle in gold.

The Bureau of Navigation flag is blue with a large circle, red upon which in white a vessel in full sail.

The Weather Bureau flags are five, as follows: (1) white flag “clear and fair”; (2) blue flag “rain or snow”; (3) white flag with lower third blue “local rain or snow”; (4) as indicator of temperatures a triangular flag in black when placed above the other flags means warmer weather; when below indicates colder weather, when not displayed means weather will remain unchanged for 24 hours; (5) the white flag with its black square in centre indicates a sudden and decided fall in temperature.

United States Public Health flag is yellow with the anchor crossed by medical device (serpent entwined about staff and double wings); these devices are in blue on the yellow field. The surgeon-general has a blue flag, the devices are in white.

The United States yacht flag is the same as the United States flag but instead of the union in blue with 48 stars the union is blue with a white anchor surrounded with 13 white stars.

The Commissioner of Fisheries has a flag of blue upon which appears a fish in white.

The United States coast survey is a flag of blue with large white circle upon which the largest possible triangle in red appears.

The flag of the cavalry is yellow or gold with Great Seal in centre in heraldic tinctures below which is a scroll in red with these words in white “United States Cavalry.” The border is narrow and light yellow.

The flag of the field artillery is red with Great Seal in centre beneath which appears a yellow scroll and in red letters the words “U. S. Field Artillery.” The border is narrow and yellow.

The United States signal corps flag is red with Great Seal in centre beneath which is a white scroll and in red letters the words “United States Signal Corps”; narrow border in yellow.

The flag of the United States marine is blue or azure in centre, globe showing the western hemisphere; above it the American eagle with wings extended, over his head a red scroll with “United States Marine Corps,” in white letters and below the anchor position the entirety surrounded by green wreath. The flag has a narrow yellow border.

The United States naval academy flag is blue, a white diamond or square upon which in blue appears the anchor of hope, just above the square in white letters “United States” and below the square «Naval Academy»; narrow yellow border.

Secretary of the Interior flag is green with four golden stars (one in each corner of flag) and in centre a buffalo in gold.

The submarine flag is red, in centre two white cannons crossed in saltire, at crossing point a mine topshaped device. Above the cannon the words «Submarine,» and below the cannon «Defense»; flag is without border.

The flag and distinguishing mark of the United States flying machines is a circle of blue upon which a large white star appears, whose tips touch the circumference of the circle; in centre of star a red disc or circle. We might add here that our ally's, the French, mark, is a circle divided by three inner circles; the outer one red, the next inner white and the central disc blue. Belgium the outer circle red, next inner yellow and the central disc blue. The British use the crosses of Saints George, Patrick, Andrew on a blue field. Russia a square with three broad stripes, the top white, the centre blue, the lowest red. Italy has a square of green, white and red and has used a red shield upon which is a large white cross.

The hospital flag is white and in the centre is a large red cross.

The ambulance company flag is maroon with the fly end swallow tailed and the medical symbols of serpent entwined on staff with the two wings white to indicate speed. It has the symbolic letters «A. C.» on it.

The naval militia flag is blue and in centre a yellow diamond with the anchor of hope in blue.

The United States naval reserve flag is blue with the fly end swallow tailed and, as the device, has the American eagle in white perched on the United States shield in proper heraldic tinctures.

The United States consular flag is blue with a large letter C for consular, and surrounding same the 13 stars in white.

The religious flag is white and in pennant form (triangular) with a large blue cross.

The United States cadet flag is silver with the American eagle perched on the United States shield; below a red scroll, white letters «United States Corps of Cadets.» On centre of shield the cap of Mars.

Submarine Warning flag red flag with large white square upon which appears a figure of a torpedo in black.

The wigwag flag of the army and navy is a red square with a white square in centre, one-third the entire width of the red flag. With the use of this flag by a system of dots and dashes words are spelled out by the flourishing of flag either from right to left.

The World War has also given us the service flag, a white field upon which is a red border one-third the width of the white. And for every person who has actually enlisted there is placed a blue star within this field. Firms wishing to indicate their patriotism place one large blue star, with the number of men enlisted in figures below the one blue star. Death to any one of the enlisted men places a gold star above the blue star.

The Red Cross nurse service, also recognized by the War and Navy departments with a white device, upon which is blazoned a red cross for every person entered from the family. Firms too indicate the number of nurses in service from the firm by a red cross and the number below in figures. Schools, colleges, universities, clubs, lodges and churches have flown the service flag and the red cross nurse device with this same meaning.

State Flags (Part V).— The States of the Union found it of value to possess State flags — and hence the legislatures made the emblems possible; and military progress also approved of these distinguishing devices, especially in interstate parades and drills. Many of these State colors appeared on the battlefields of Europe and State pride contributed much to national valor. Taking them in order in which the States accepted the present Federal Constitution, these State flags in brief description are as follows:

Delaware State Flag.—A blue flag, accepted 1914, has centre a large diamond field or, upon which in centre appears the device of the State Great Seal, in proper colors under it «December 7, 1787.»

Pennsylvania. The State Flag is blue and in centre the device of the State Seal in heraldic tinctures. Adopted 13 June 1907.

New Jersey State Flag, adopted March 1896, is yellow with the devices of the State Seal in the centre.

Georgia State Flag is blue the first third horizontally at pole side upon which appears the State Seal. The remaining two-thirds is divided with three horizontal stripes: upper and lower red, the centre one white. It was adopted in 1879.

Connecticut State Flag is blue with the devices of State Seal at centre.

Massachusetts State Flag is white with the devices of State Seal at centre. Approved 1908.

Maryland State Flag is shield of the State which is the personal shield of Lord Baltimore; the tinctures are red, black, gold and silver. Adopted 1904.

South Carolina State Flag is blue with an Arg. crescent at the point in union and a white palmetto tree in centre of flag. This flag was adopted in 1861.

New Hampshire State Flag is blue and has the State Seal in the centre. It was adopted 1909.

Virginia State Flag is blue with State Seal in centre. Adopted 1861.

New York State Flag is blue with the device of the State Seal in the centre. It was adopted in 1909.

North Carolina State Flag, adopted in 1885, has one-third blue (horizontal stripes at pole or hoist side) and upon it a yellow scroll with «May 20, 1775,» under this the letters «N. C.» divided by a white star; under the foregoing a scroll in yellow with words «April 12, 1776.» The remaining two-thirds divided by two horizontal-stripes, the upper one red, the lower one white.

Rhode Island State Flag, adopted in 1877, is white with anchor in gold. Scroll under it in blue upon which the word «Hope» appears in gold. The entirety surrounded by 13 golden stars.

Vermont State Flag is 13 stripes alternate red and white with a blue union, and upon which is a large eight-pointed star-like emblem, in the centre of which is the State Seal. It was adopted in 1862.

Kentucky State Flag is blue, in centre the device of the State Seal. Accepted in 1880.

Tennessee State Flag is red, in centre a circle of blue upon which appears three silver stars; at the fly end is a narrow blue stripe. Adopted in 1905.

Ohio State Flag, adopted in 1902, is pennant formed. At staff or pole side appears a blue triangular field with a circle at centre, of white with red disc, and clustered about the circle which stands for "O" in Ohio are 17 stars; the pennant swallow tailed reaches out full width of the blue triangle and has five stripes alternate red and white.

Louisiana State Flag is blue, and a pelican in white is feeding its young. Below device the words: "Union, Justice and Confidence." Adopted 1912.

Indiana State Flag is blue, in centre a torch in yellow, above the flame a large star above which the word Indiana in gold appears. Surrounding the entirety are 13 stars and within the lower part of this starry circle are five other stars. Adopted 1901.

Mississippi State Flag adopted after the Civil War, is of three stripes, blue, white and red with a red union upon which appears a blue cross of Saint Andrew with 13 white stars.

Illinois State Flag is white with the device of the State Seal in the centre. It was adopted 1915.

Alabama State Flag, adopted 16 July 1895, Saint Andrew's cross in red upon a white field.

Maine State Flag, adopted in 1909, consists of a field of blue upon which in centre is the device of the State Seal.

Missouri State Flag, adopted 1913, is of three stripes, red, white and blue, in the centre a blue broad circle upon which are 24 white stars and within this circle the devices and motto of the State Seal.

Arkansas State Flag is red and a white diamond upon which appears in blue letters the word "Arkansas," a blue star above and two blue stars below that word. Surrounding the white diamond is a blue border upon which are 25 white stars. Adopted 26 Feb. 1913.

Michigan State Flag is blue with the device of the State Seal in centre. The word "Michigan" in white letters under the device—adopted in 1911.

Florida State Flag adopted in 1899 is white with a red Saint Andrew's cross at the centre of which are the devices of the State Seal.

Texas State Flag is of white and red stripe with a broad blue perpendicular stripe at hoist or staff side and upon it a large white star. It was the colors of the embryo republic.

Iowa State Flag, adopted in May 1917, is white with an American Eagle holding in his beak the scroll with letters in blue these words: "Our Liberties We Prize and Our Rights We Will Maintain." Under these words in red is the word "Iowa."

Wisconsin State Flag, adopted 1913, is blue and in centre the devices of the State Seal. The word "Forward" in red above device.

California State Flag, adopted 1911, is white with a red stripe below and a red star at the union. A grizzly bear at centre of flag, under that device the words in black, "California Republic."

Minnesota State Flag is blue and at centre devices of State Seal. The tip of the staff has a golden gopher. Adopted 1893.

Oregon State Flag is blue with the devices of State Seal at centre.

Kansas State Flag is blue and in the centre the State Seal appears as the emblem.

West Virginia State Flag is white, in the centre the device of the State Seal appears, under same on a red scroll the words in gold "West Virginia." Adopted in 1904.

Nevada State Flag is blue and in centre the State Seal device appears; arched above it are 18 golden stars and below are 18 stars in silver.

Nebraska State Flag is yellow or gold with State Seal in centre.

Colorado State Flag is of three stripes alternate blue and white; at the hoist end a large red letter, an open "C" for Colorado, embraces or holds a circle of gold. Adopted 1908.

North Dakota State Flag is blue with a displayed American Eagle, over his head a burst of glory and 13 stars. Under device on scroll of red the words "North Dakota" in white letters. Adopted 1911.

South Dakota State Flag, adopted in 1909, is blue with State Seal at the centre.

Montana State Flag, adopted in 1905, is blue and at centre device of State Seal.

Washington State Flag while not of legislative creation is of military design and consists of a green field of hope upon which in centre is the State Seal which is the front view of the face of George Washington.

Idaho State Flag is blue with device of State Seal at centre. Under same on a scroll of red the words "State of Idaho" in white letters. Adopted 1909.

Wyoming State Flag, adopted January 1917. The flag is blue and has a border of red, and border of white next to the field of blue. In centre a white buffalo on which appears in proper tinctures the State Seal.

Utah State Flag is blue and in centre a golden circle within which are the State emblems in proper heraldic colors, draped on dexter and sinister sides with American flags. It was adopted in 1911.

Oklahoma State Flag adopted 1911 is red with a large white star of blue border, within the star the figures 46 in blue which express that this State was No. 46 to enter the union of States.

New Mexico State Flag is of turquoise blue; as the union appears the American flag with 47 stars; in the upper fly corner the figures 47, in the lower fly corner the State Seal and across the centre of flag in white the words "New Mexico."

Arizona State Flag is of two stripes, upper red and lower blue; the upper stripe is of 13 rays of glory alternate red and yellow. In the centre of the flag a large golden star overlaps the two stripes of which the flag is composed.

District of Columbia Flag as carried by its National Guard is blue; on centre an ax or hatchet, under which are these words on a scroll, "District of Columbia Militia."

Hawaii Flag is of nine stripes alternate, white, red and blue, and as a union of blue the crosses of Saints George, Patrick and Andrew.

Alaska happens to be the only Territory of the United States without a flag but with propriety could carry a white field (snow covered) with the Alaska seal in yellow or gold.

Philippine Islands use the device American Shield, at centre the ancient arms of Manila. As a crest the American spread eagle. Adopted 1905.

Porto Rico has the ancient arms of the Spanish colony with letters «F and I,» Ferdinand and Isabella. Adopted 1905.

Tokens and Trophies (Part VI).— The Federal government has many flags, banners and standards of historic value; some of odd design, yet filled with American symbolisms and spirit, while others are trophies captured from the enemies. These memorable flags are on exhibition at the National museums at Washington, D. C., Annapolis Naval Academy and West Point Military Academy, and other remarkable flags are displayed at the State Capitol, Albany; Memorial Hall, Chicago; Springfield, Ill.; Madison, Wis.; Trenton, N. J.; Boston, Mass.; Independence Hall, Philadelphia, Pa.; Atlanta, Ga.; Nashville, Tenn.; Saint Louis, Mo.; Richmond, Va.; Harrisburg, Pa.; New York city. While all other States, especially such as sent regiments to the wars of the Revolution, of 1812, of 1846 and of 1861 also have trophies and tokens on exhibition. At the Washington, D. C., National Museum can be seen the repaired and restored American flag which floated over Fort McHenry in 1814 and inspired Francis Scott Key to write the National anthem, «The Star Spangled Banner;» this flag has 15 stars and 15 stripes. Many trophies of the Revolution, War of 1812, Mexican War, Civil War and of the Spanish-American War are also at this National Museum. The Paul Jones flag of 13 stripes and 12 stars is also here on exhibition. The flag of the *Maine*, the ship whose sinking precipitated the Spanish-American War, is at Annapolis, Md. The standards Admiral Dewey captured from the Spanish are near by, as are trophies from Santiago and Cuba. At the same Annapolis Naval Academy are the Com. O. H. Perry flag of blue with the dying words of Captain Lawrence: «Don't Give Up the Ship,» used by Perry 10 Sept. 1813. Also a royal British flag captured in 1813 when the capital of Canada fell into American hands. There are a few unique or curious flags, which are not in accord with the Continental law of 14 June 1777; as an example, the one hoisted 16 Aug. 1777 at the battle of Bennington, as it contained 13 stripes, seven white and six red, and its union of blue contained 11 seven-pointed stars arched over the figures «76» with one star in the dexter and one in the sinister parts of that azure union. A similar incorrect flag waved at the fall of Yorktown, 19 Oct. 1781; it had the union proper but it contained 13 stripes alternate white and red instead of alternate red and white. The writer made a copy of this flag from the pen and ink sketch left by Major Sebastian Bauman, only officer in the New York regiment of artillery not a native-born American. He was also an original member of the New York Society of the Order of Cincinnati. His drawing of this unique flag is in the collection of the New York Historical Society.

At the State House, Annapolis, is exhibited an original 13-star, 13-stripe American flag of pattern form, law of 14 June 1777.

The Philadelphia Light Horse flag, earliest colonial flag to have the 13 stripes of blue and white, is deposited in the safe of that troop.

The entire Peter Force flag collection of captured naval ensigns, recently donated to the Library of Congress, has been deposited in the National Museum. Here too is the flag of the *Kearsarge* in use at the time of surrender of the Confederate cruiser *Alabama*. Also the first flag of the United States of America to be raised over Richmond after its surrender to the Federal troops. A score or more Spanish flags are here as trophies, but the token which attracts great attention is the pennant which was flown on the *Brooklyn* during the naval battle off Santiago.

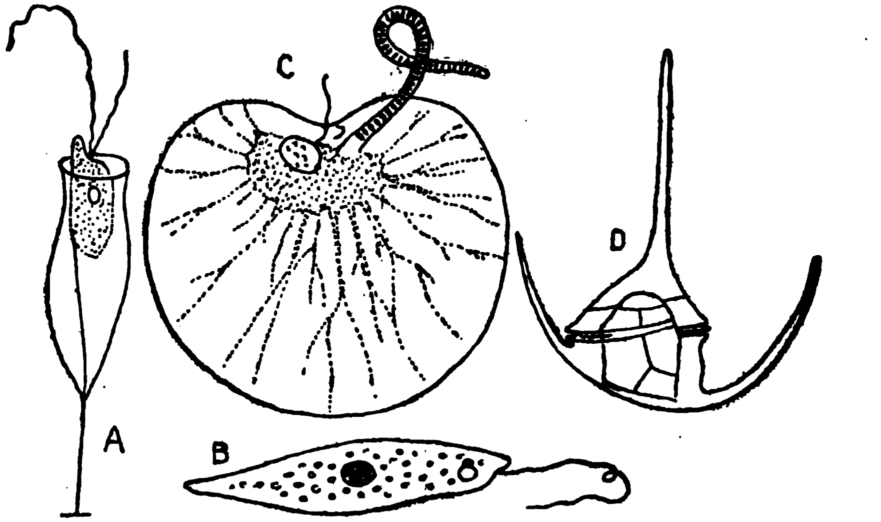
An interesting item relates to the placing of the stars and stripes in Saint Paul's Cathedral, London, in honor of the American Legion composed of Americans who were fighting in the British army before the United States joined the Allies. The members of the legion hailed from the United States and crossed the Atlantic to assist in defeating the Germanic designs against freedom. Other American flags have been deposited in English historic buildings, notably as a decoration in the Guild Hall, London.

The American flag is receiving equally memorable consideration in France and Belgium; in the former at Paris in innumerable places of note the American flag is donated and deposited as a heritage of the spirit of liberty. The American flag of the Foreign Legion, composed of Americans serving in the French divisions, was requested by the French government as a token of fraternal spirit and was deposited in the museum of the army in the Hotel des Invalides, Paris.

Trophies also which have a pathetic interest in American progress and unity are those of the Confederate States flags. See FLAGS, CONFEDERATE.

BERNARD J. CIGRAND,
Lieutenant United States Navy; Author 'Real History of United States Flag'; 'History of American Emblems,' etc.; Member of Faculty University of Illinois; former President of the Chicago Public Library.

FLAGELLANTS, flaj'e-lants (Lat. *flagellare*, to lash or scourge), a sect which arose in 1260 at Perugia, called by the French *Perouse*, and spread throughout and beyond Italy. Its adherents, said to have numbered 10,000, attempted to expiate their sins and obtain mercy by self-inflicted suffering. They ran through the cities scourging their bare shoulders and exhorting bystanders to repentance. Led by priests bearing banners and crosses, they moved in procession through the streets. They could be seen going about by night as well as by day, even in the cold of winter. They went in thousands from country to country begging alms. In 1261 they crossed the Alps in Alsatia, Bavaria, Bohemia and Poland, and found there many imitators. In 1296 a small band of Flagellants appeared in Strassburg, who, with covered faces, whipped themselves through the city, and at every church. At first the Flagellants were noted for sanctity, and made many converts even from the most abandoned classes, but doubtful characters beginning to join their ranks, they fell into disrepute, and were restrained from their processions by the civil and ecclesiastical authorities, and the sect gradually died away. The terror produced by the dreadful disease called the black death, which destroyed many millions of people in Europe in the middle of the 14th century, produced a revival of the flagellation mania, which spread over most of Europe and was attended by greater extravagances than before. In the reign of Edward III, a band of 120 Flagellants, male and female, made their appearance in London on a missionary enterprise, but had to leave the country without having made one proselyte. In 1349 Clement VII declared the Flagellants heretics and took steps to repress them. In 1360 an effort was made in Thuringia to revive them, under a form marked by wild fanaticism and by strange doctrines which were condemned by the Council of Constance. The burning alive of their leader, Conrad Schmidt, and 90 of his followers, in 1369, partially checked the project, though the extirpation of the sect was found a work of extreme difficulty. One form of fanaticism which marked some of the Flagellants was violent hatred and persecution of Jews. Generally speaking the Flagellants gradually disappeared, beginning with the 14th century. There were, however, spasmodic and more or less isolated revivals, as in France in the 16th century, in Germany in the 17th century, and in various countries outside of Europe, especially in South America, frequently as a result of over-zealous attempts at conversion on the part of religious orders. The most striking example, perhaps, of this last type of Flagellants were the *Hermanos Penitentes* amongst converted Indians of New Mexico and Colorado who as late as the end of the 19th century practised ceremonial flagellation going frequently to great excesses in spite of attempts of civil and ecclesiastic authorities to suppress them. (See FLAGELLATION). Consult Boileau, J., 'Historia Flagellantium' (Paris 1700); Collas, G. F., 'Geschichte des Flagellantismus, etc.' (in progress, Leipzig 1913); Cooper, W. M., 'Flagellation and the Flagellants' (London 1898); Deane, I., 'The New Flagellants' (in *Catholic World*, Vol. XXXIX, p. 300, New York 1884); Döring, G. C. W. A., 'Die Geisselfahrt' (Frankfort-on-Main 1833); Förstemann, E. G., 'Die Christlichen Geisslergesellschaften' (Halle 1828); Runge, P., ed., 'Die Lieder und Melodien der Geissler des Jahres 1349, etc.' (Leipzig 1900); Schneller, C., 'Statuten Einer Geissler-Bruderschaft in Trient aus dem 14. Jahrhundert' (in Zeitschrift des Ferdinandemus Geschichtliche Abteilung, Series III, part 25, p. 3, Innsbruck 1881).



Various Flagellata. A, Bicoseca; B, Englina vividis (Autoflagellatia); C, Noctiluca miliaris (Cystoflagellate); D, Ceratium tripos (Dinoflagellate).

FLAGELLATA, a group of *Protozoa*, sometimes regarded as a division of the class Infusoria, sometimes as a distinct class by itself. The group is characterized by having a body-form usually fixed and definite for the species, and by having as organs for locomotion and taking of food one or more long vibratile whiplash-like processes, the «flagella.» Like all Protozoa (q.v.) the body is composed of a single cell. The group is divided into three orders: *Autoflagellata, Dinoflagellata* and *Cystoflagellata*. In the Autoflagellata the body is usually oval and has both nucleus and contractile vacuoles; sometimes the body is naked and capable of amœboid motions, but usually it has a cuticle, and enveloping cases are not uncommon. In one sub-order (*Choanoflagellata*) a peculiar collar-like structure is developed around the flagellum. Some of the group closely approximate plants, some forms like Euglena and Volvox being claimed by the botanist. A few are human parasites. The Dinoflagellata have a firm external armor of hard cellulose plates, divided by a groove around the body, and with a second longitudinal groove. At the junction of the two grooves are the two flagella, one lying in the circular groove, the other projecting freely. These forms occur in salt and fresh water. In the Cystoflagellata the large gelatinous body is enclosed in a stout membrane. The best-known form is Noctiluca (q.v.), noted for its phosphorescent powers. These minute creatures exist in countless swarms and form the food of a host of marine creatures a little larger or higher in rank of organization.

FLAGELLATION, scourging or whipping, either self-inflicted or administered by another person, especially as a religious practice. Originally it was used primarily as a corrective penalty for clerics. Its use spread with the gradual growth of monastic institutions. Its application as a means of religious penance is an old Oriental custom, admitted into Christianity partly because self-torment was considered salutary as mortifying the flesh, and partly because both Christ and the apostles underwent scourging. It was also practised as a devotional measure toward certain deities in Greece and Rome. From the 1st century of Christianity religious persons sought to atone for their sins by voluntary bodily torture. Like the Abbot Regino, at Prum, in the 10th century, many tried to imitate the sufferings of Christ, in order to make themselves the more certain of forgiveness through him. It became general in the 11th century, when Peter Damian of Ravenna, abbot of the Benedictine monastery of Santa Croce d'Avellano, near Gubbio, in Italy, afterward cardinal bishop of Ostia, zealously recommended scourging as an atonement for sin, to Christians generally, and, in particular, to the monks. His own example and the fame of his sanctity rendered his exhortations effective. Clergy and laity, men and women, began to torture themselves with rods, and thongs and chains. They fixed certain times for the infliction of this discipline upon themselves. Princes caused themselves to be scourged naked by their father confessors. Louis IX constantly carried with him for this purpose an ivory box, containing five small iron chains, and exhorted his father confessor to scourge him with severity. He likewise gave similar boxes to the princes and princesses of his house, and to other pious friends, as marks of his peculiar favor.

The expectation of being purified from sin by flagellation prevailed throughout Europe in the last half of the 13th century. «About this time,» says the monk of Padua in his chronicles of the year 1260, «when all Italy was filled with vice, the Perugians suddenly entered upon a course never before thought of; after them the Romans, and at length all Italy. Men of noble and ignoble birth, old and young, traversed the streets of the city naked, yet without shame. Each carried a scourge in his hand, with which he drew forth blood from his tortured body, amidst sighs and tears, singing at the same time penitential psalms.» The penitents united into fraternities called the Flagellants (q.v.). After the Council of Constance (1414–18) both clergy and laity gradually abandoned flagellation. The Franciscan monks in France (Cordeliers) observed the practice longest.

Flagellation was sometimes voluntary and sometimes imposed as a penance. Henry II of England allowed himself to be scourged at the tomb of Thomas à Becket (q.v.). In its theological aspect flagellation has no especial merit in itself and is classed merely as a form of penance or self-mortification. It is meritorious only as a means of expiation of sins repented for and absolved, or as a method of mortification of the flesh for the suppression and control of the passions. Any excess in it is prohibited. (See PENANCE). For an exhaustive bibliography on this topic consult Haupt, H., 'Flagellation' (in Schaff-Herzog, 'Encyclopedia of Religious Knowledge,' Vol. IV, New York 1909).

FLAGELLUM DEI, flā-jĕl'lŭm dā'ē («Scourge of God»), a title commonly bestowed on Attila, King of the Huns.

FLAGEOLET, flaj'ō-let, a small wind-instrument, the notes of which are exceedingly clear and shrill. It is a sort of whistle with a mouth-piece that is usually inserted in a bulb. In appearance, etc., it may be said to belong to the flute family of musical instruments; but it is always used in a vertical instead of horizontal position. It is generally made of box or other hard wood, though sometimes of ivory, and has six holes for the regulation of its sounds, besides those at the bottom and mouth-piece, and that behind the neck. Its compass is two octaves, and a set of five different sizes is needed to take all the semitones in this range. Its inventor is said to have been Sieur Juvigny in the latter part of the 16th century. Previously, however, similar instruments had been used for many centuries by a number of peoples of comparatively primitive civilization, as the North American Indians. The use of the flageolet is never indicated in orchestral scores, though it was used with considerable frequency both as a solo instrument and in small wind bands in England and in most countries of the continent for more than 200 years. It became more or less obsolete in the beginning of the 19th century. Occasionally, in the French and English provinces, it is still employed chiefly for dance music. Very little music has ever been composed for it. Double and triple flageolets, slightly more complicated variations of the single instrument, have been built, but are seldom used. Consult Burney, Charles, 'A General History of Music, etc.' (4 vols., London 1776–89); Cresson, H. T., 'Construction of Ancient Terra-Cotta Pitch-Pipes and Flageolets' (in *American Naturalist*, Vol. XVIII, p. 498, Philadelphia 1884); Greeting, T., 'Pleasant Companion; or New Lessons and Instructions for the Flageolet' (London 1675); Mersenne, M., 'Harmonie Universelle' (Paris 1636).

FLAGET, flā-zhā, **Benedict Joseph,** American Roman Catholic bishop: b. Contournat, Auvergne, France, 7 Nov. 1763; d. Nazareth, Ky., 11 Feb. 1850. He was educated in France, joined the order of Sulpicians and after his ordination taught for some years at the theological seminary at Nantes. In 1792 he came to America and was assigned by Bishop Carroll of Baltimore to the mission of Vincennes, Ind. His work as a missionary in what was then the outposts of white civilization was highly successful, both amongst the white settlers and the Indians. In 1795 he joined the faculty of Georgetown College. From 1798–1801 he was in Havana, Cuba, and from 1801–09 he taught at Saint Mary's Seminary, Baltimore. In

1810 he was consecrated bishop of Bardstown, Ky. His diocese was of vast extent, reaching to the Mississippi River and to the Great Lakes, and very undeveloped. He worked in it untiringly and with great success, being assisted later by two coadjutors. In 1841 the see was removed to Louisville, Ky., and his title was changed to Bishop of Louisville. From 1835–39 he spent abroad, being received with many honors at Rome. At the time of his death his see had become wonderfully developed. The number of Catholics in it had greatly increased and many educational, charitable and ecclesiastic institutions had been founded and securely established. Consult Howlett, W. J., ‘Bishop Flaget's Diary’ (in *American Catholic Historical Society of Philadelphia, Records,* Vol. XXIX, Philadelphia 1918); Spalding, M. J., ‘Life of Bishop Flaget’ (Louisville 1852).

FLAGG, Charles Noel, portrait painter: b. Brooklyn, 25 Dec. 1848; d. Hartford, Conn., 10 Nov. 1916. He was the son of Rev. Jared Bradley Flagg, artist and clergyman, and his brothers were Ernest Flagg, architect of the Singer Building, New York city, etc.; and Montague Flagg, artist and national academician. He studied art under L. Jacquesson de la Chevreuse. In 1888 he founded the Connecticut League of Art Students, now the Flagg Night School of Drawing for Men, of which he was director. He was a member of the Connecticut State Capitol Commission of Sculpture, president of the Connecticut Academy of Fine Arts, and other civic and art associations. A member of the National Academy of Design, his portrait of Paul Bartlett, the sculptor, won the portraiture prize in 1908. He became recognized as one of the foremost portrait painters in this country and painted many of the portraits of governors of Connecticut for the State capitol collection. Outside portraiture one of his greatest pictures was the ‘Seizure of the Charter’ in the capitol at Hartford. He was a frequent contributor to art and other magazines and was the author of ‘The Evolution of an Equestrian Statue’ (1909).

FLAGG, Ernest, architect, brother of Charles Noel Flagg: b. Brooklyn, N. Y., 6 Feb. 1857. He studied under Blondel, in Ecole des Beaux Arts at Paris, and in 1891 became an architect in New York. Among his most notable works are the Singer Building and Saint Luke's Hospital, New York; the national Naval Academy, Annapolis, Md.; the Corcoran Gallery of Art, Washington, etc. He is also a prolific contributor to magazines and other periodicals on good roads and pavements, model tenements, etc.

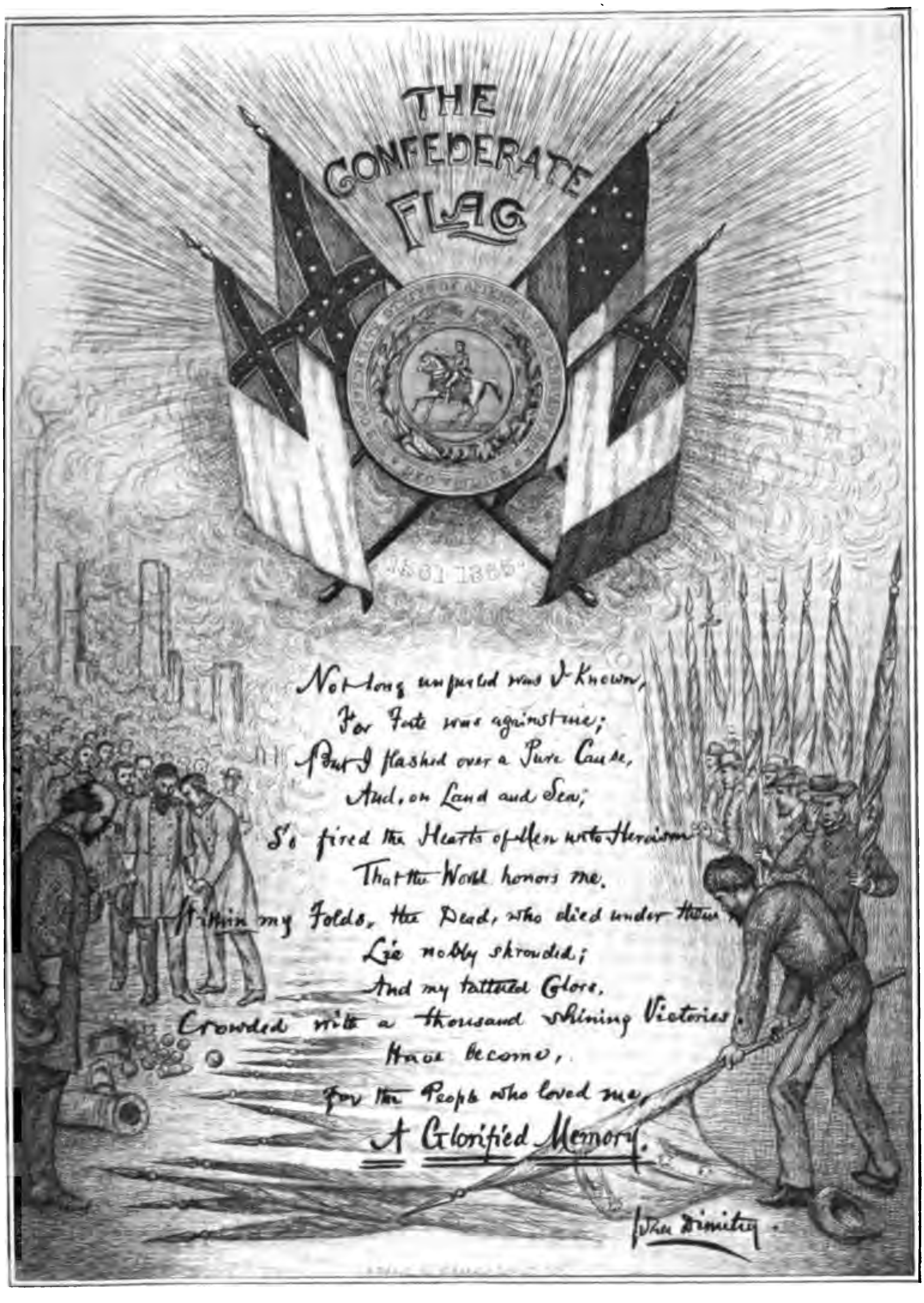
FLAGG, George Whiting, American artist: b. New Haven, Conn., 26 June 1816; d. Nantucket, Mass., 5 Jan. 1897. He showed remarkable artistic ability very early in life. Some of the paintings of this period are now in the collection of the Historical Society of New York city. He studied under Washington Allston and later for nine years in Europe, especially in London, England; on his return to the United States he opened a studio first in New Haven and later in New York. He was elected a member of the National Academy of Design in 1851. Among his best-known paintings are ‘Landing of the Pilgrims’; ‘Washington Receiving His Mother's Blessing’; ‘The Good Samaritan’; ‘The Scarlet Letter’; and ‘The Execution of Lady Jane Grey.’ The second of these is especially well known through the many engravings which were made after it. Much of his work is of a highly ideal type and throughout his entire career he was never influenced by any commercial considerations. His works consist of historical and genre pictures and of a few portraits.

FLAGG, Isaac, American Greek scholar: b. Beverly, Mass., 7 Sept. 1843. He is a son of Wilson Flagg (q.v.), and was prepared for college at Andover Phillips Academy, was graduated from Harvard 1864, and was tutor in the College 1865–69. He studied in Göttingen and Berlin, and received the degree of Ph.D. at Göttingen 1871. He was professor of Greek in Cornell University 1871–88, professor of classical philology in the University of California 1890–99, professor of Greek 1899–1909, since then professor emeritus. He has edited the ‘Hellenic Orations of Demosthenes’; ‘Seven against Thebes’ of Æschylus; the ‘Iphigenia in Tauris’ of Euripides; Plato's ‘Apology’ and ‘Crito,’ etc. He is the author of ‘Outlines of the Temporal and Model Principles of Attic Prose’; author also of ‘Versicles’; ‘Hylethen, a Lyrical Missive’; ‘Circe, a Dramatic Fantasy’ (1910); and other poems.

FLAGG, James Montgomery, artist and author: b. Pelham Manor, N. Y., 18 June 1877. After early studies in New York, under Herkomer in England and Marec in Paris, he became speedily known by his magazine contributions and his illustrated volumes of poetry and prose, which revealed remarkable versatility, technical ability and vivacious humor, whether in oils, pen and ink, charcoal or crayon. His first drawing was published in *Life* at the age of 14. His portrait in oils of Mark Twain, one of his best, is in the Lotos Club, New York. His illustrated volumes of prose and poetry include ‘Tomfoolery’ (1904); ‘If: a Guide to Bad Manners’ (1905); ‘Why They Married’ (1906); ‘All in the Same Boat’ (1908); ‘City People’ (1909); ‘I Should Say So’ (1914).

FLAGLER, Henry M., American capitalist: b. Canandaigua, N. Y., 1830; d. 20 May 1913. He began life as a clerk in a country store, then going to Saginaw, Mich., he became a salt manufacturer. He afterward removed to Cleveland, Ohio, and formed one of the firm of Rockefeller, Andrews and Flagler, now known as the Standard Oil Company and with which he was associated until 1911. He was the proprietor of some 600 miles of railroad in Florida and of the Ponce de Leon and Alcazar hotels at Saint Augustine. As builder and owner of these palatial hotels he did much to make Saint Augustine, Fla., a popular winter resort.

FLAGS, Confederate. Early in the career of secession designs for flags were offered to the Confederate Congress. Devices were sent in daily and a mass of ideas was collected, illustrating a still lingering love for the United States flag, while most of them were radical departures from its heraldic character. The entire political, educational and religious spirit of the Confederacy took a deep concern



Not long unfurled was I known,
For Fate was against me;
But I flashed over a Pure Cause,
And, on Land and Sea,
So fired the Hearts of Men unto Heroism
That the World honors me.
Within my Folds, the Dead, who died under them,
Lie nobly shrouded;
And my tattered Glory,
Crowded with a thousand shining Victories,
Have become,
For the People who loved me,
A Glorified Memory.

John Dimitry.

THE CONFEDERATE FLAG

in the proposition of a flag, and even Stephens, Tombs, Clinton, Wickham, and Semmes took the time from legislative and military duties to devise some flag symbols. In the midst of the deliberations a committee, the Confederate Congress, decided to turn the matter, with the hundreds of suggestions, to a committee, which was composed of Miles (S. C.), Morton (Fla.), Shorter (Ala.), Barton (Ga.), Sparrow (La.) and Harris (Miss.), which committee reported 5 March 1861. Some of the introductory sentences copied from the original read: «Whatever attachment may be felt, from association, for the stars and stripes (an attachment which your committee may be permitted to say they do not all share), it is manifest that, in inaugurating a new government, we cannot retain the flag of the government from which we have withdrawn, with any propriety, or without encountering very obvious practical difficulties. It is idle talk of retaining the flag of the United States when we have voluntarily seceded from them.» And this sentence, «It must be admitted, however, that something was conceded by the committee to *what seemed so strong and earnest* a desire to retain at least a suggestion of the old stars and stripes. So much for the mass of models or designs more or less copied from or assimilated to, the United States flag.» The long report indulges in some historical references and strongly argues that the colonists forgot the glories of the British flag and wound up with this stand: «Yet under that British flag the colonists fought in their infancy for their very existence, against more than one determined foe. Under it they had repelled and driven back the relentless savage, and carried it farther and farther into the decreasing wilderness as the standard of civilization and religion. Under it the youthful Washington won his spurs in the memorable and unfortunate expedition of Braddock, and Americans helped to plant it on the Plains of Abraham when the immortal Wolf fell. But our forefathers, when they separated themselves from Great Britain . . . they cast no lingering, regretful looks behind.» And summed it up: «The committee, on examining the representations of the flags of all countries, found that Liberia and the Sandwich Islands had flags so similar to that of the United States that it seemed an additional if not a conclusive reason why we should not keep — copy — or imitate it. They (the committee) feel no inclination to borrow at second hand what had been pilfered and appropriated by a free negro community and a race of savages.»

The committee reported (5 March) the following which was adopted on same day, but by vote the flag of the Confederacy, as by committee suggestion, was ordered on the books of 4 March, to be of even date with Abraham Lincoln's inauguration. The report and law reads:

«That the Flag of the Confederate States of America shall consist of a red field with a white space extending horizontally through the center, and equal in width to one-third the width of the flag. The red spaces above and below to be of the same width as the white. The union blue extending down through the white space and stopping at the lower red space. In the center of the union a circle of white stars, corresponding in number with the States in the Confederacy.»

This flag with its seven stars (representing the seven states which rebelled) was unfurled over the State House at Montgomery, Ga., on 4 March 1861. But the new flag did not prove satisfactory to many radical politicians, nor was it satisfactory in military or naval actions because of its striking similarity to the Star Spangled Banner; at the first battle, 21 July 1861 — Bull Run (called by Southerners as the battle of Manasses), the opposing commanders accused the enemy of displaying the colors of the antagonizing forces. By a strange coincidence, one of the flag committee, Mr. F. S. Barlow (General at the battle of Bull Run) was killed attempting to serve that duplication. It became evident that a new flag for battle purposes must be created. A flag of that character was devised by Edward C. Hancock of New Orleans, and by end of October it was in general use as adopted by Confederate officers, and was as follows: «The Battle Flag is square, having a Greek Cross (saltier) of blue, edged with white, with thirteen equal white five pointed stars; upon a red field; the whole bordered with white.» But the southern people demanded a National and not a Battle Flag, with the result that the Confederate Congress adopted the following flag on 1 May 1863: «The Congress of the Confederate States of America do enact, That the Flag of the Confederate States shall be as follows: The field to be white, the length double the width of the flag, with the union (now used as the Battle Flag) to be a square of two-thirds the width of the flag, having the ground red; thereon a broad saltier of blue, bordered with white, and emblazoned with white mullets or five pointed stars, corresponding in number to that of the Confederate States.» This flag proved most unsatisfactory because of its too liberal white, would be accepted as a flag of truce and also because it was too similar to the English White Ensign, and both these objections showed in tests of war. This led to new suggestions and the Richmond *Examiner* commented: «Before we get our national emblem we must get rid of stars and stripes in all their variations. So too of all arrangements of red, white and blue. . . . The national emblem of the equestrian South is the Horse. Its colors are black and white; its shield is the sable horse of Manassas on a silver field; its flag is the white flag with the black horse. Neither belong to any other nation of Christians.»

This proposal met with considerable favor, especially because of the incorporation of the Horse, but it was rejected, only to be later accepted on the signature of the South. See GREAT SEAL OF THE CONFEDERACY.

Innumerable were the suggestions, and finally came the short lived National Flag adopted 4 March 1864 by the Confederacy — as follows: «The width, two-thirds of its length, with the union (now used as the Battle Flag) to be in width three-fifths of the width of the flag, and so proportioned as to leave the length of the field on the side of the union twice the width of the field below it; to have the ground red and a broad, blue saltier thereon, bordered with white and emblazoned with mullets or five pointed stars, corresponding in number to that of the Confederate States; the field to be white except the outer half from the union to be a red bar exending the width of the flag.»

What Rear-Admiral George H. Preble, U. S. N., wrote in 1880 has during the World War come true: «Should, unfortunately, our country engage in another war foreign or domestic it is to be hoped that our dear old flag the 'Star Spangled Banner'—of The Union, will be soul inspiring to the soldiers of the common country, whether Northern, Southern, Eastern or Western, and that all sectional emblems will be subservient beneath the folds of the United States Flag.»

This was true in the Spanish-American War but in a more emphatic way today as a United American folk, love and revere the flag of the Revolutionary forefathers.

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FLAGS OF FOREIGN NATIONS. It is but proper that in the study of flags those of foreign nations be considered: the English from which we withdrew, as well the French, from whence we derived considerable aid, deserve to be treated at some length; while the neighboring flags of the Western Continent, as those across the two oceans, merit consideration.

When in 1066, William the Conqueror, Duke of Normandy, invaded England and defeated the Saxons, at the battle of Hastings, he had as his principal flag a dragon device; it was not painted nor embossed on the cloth, but was a floating figure, and as the wind struck into it it filled the two walls of the device and thus made an inflated living creature. Later he had a banner of white bordered with blue and in the union a large cross in gold. Richard the Lion-hearted also displayed a dragon standard, but not until Henry the III was it designed to portray the dragon of red silk, sparkling all over with fine gold, the tongue representing a shooting flame, with the eyes of sapphire.

Gradually the Christian device, The Cross, came into the English standard because of the British activities in the Crusades. The Cross was in white generally on a field of red; but in the wars of the Black Prince, the English cross was red on a field of white, this is best known as the cross of Saint George (white flag with red cross). About this same period of the Crusades the Scottish standard was that of the cross of Saint Andrew (a large X white on a blue field), as the legend tells the white cross was seen in the actual blue sky during a great battle in 940, when the Scots and Picts defeated England. When the Scotch became a part of Britain they enforced their Saint Andrew's flag upon the united standard. The royal flags of Britain, since the time of King Richard I in 1194, have always borne the Coat of Arms of the reigning monarch. But in 1606 King James I ordered a joint device, the Union Jack—called so, as he always signed his name Jack or Jacques, the French for James. The Irish device in the union of 1801 was the saltire red on a white field. It is this device (Union Jack), which is the union of the British flags made in red. Innumerable have been the changes in the British standards, and various the symbolic designs.

The French Flag with its three broad stripes or pales of blue, white and red may well be said to have had their origin from General Lafayette, who doubtless was inclined to the choice of these heraldic tinctures from having served under the Stars and Stripes; in 1789, when Lafayette was chosen by acclamation commander-in-chief of the National Guard of France, he was delegated to design a distinguishing mark for these soldier bodies. He chose a cockade made of blue, white and red, the first represented the royal family, the red and blue were the ancient colors of Paris and hence Lafayette either by coincidence or design gave to France the same colors he so dearly loved in America, and it was but natural when a flag was desired for the National Guard, to convert the tinctures of the cockade into the banner. Prior to the present tricolor of France the kings had their own royal standard. Charles IX had «pillars»; Henry II, «a half moon»; Henry III, «three crowns»; Philip Augustus, «a lion»; Louis VIII, «a boar»; Saint Louis, «a dragon»; Philip the Bold, «an eagle»; Charles the Fair, «a leopard»; John, «swans»; Charles V, «greyhounds»; Charles VII and VIII, « a winged stag»; Louis XII, «a porcupine»; Francis I, «the Salamander»; Louis VII, «the fleur de lis.» To France we owe appreciation for evolving heraldic science and the French classification of symbolic devices is the most perfect in military annals. Most of the early French flags terminated in three points to illustrate that the French people believe in the Trinity. The French Church and Crusade flags were red with a green border emblematic that they would give their blood and the green as a sign of hope, new life, or springtime. In 1364 King Charles V placed three fleurs-de-lis on an azure or blue field, and up to Louis XIV, 1644, the blue flag with the three fleurs-de-lis was the national military standard of France. The pure white standard of the Huguenots with Henry III and Henry IV as their leaders became also the argent colors of the Bourbon and royal France flag. The French President's flag is the same as the flag of France, with the addition of the letters «R.F.» in gold meaning «Republic of France.»

Italy.— The royal standard, white with a blue border, displays the full armorial achievements of the king. The naval flag displays three vertical stripes of green, white and red; in the centre is a red shield charged with a white cross, and bordered with blue crested with the crown. The arms of the House of Savoy are displayed on the ensign and merchant flag.

Germany.— The imperial standard displays on a yellow or gold field the iron cross (or cross of the Teutonic knights) with the motto «Gott mitt uns.» In the centre is an eagle, and on a yellow field are mingled imperial crowns and eagles in black. The naval ensign is white, divided by a black cross. On the outer section of the cross is the Prussian eagle on a white field. The upper quarter next to the flagstaff is composed of three horizontal stripes of black, white and red, with the iron cross in the centre—red representing the old Hanseatic League, and black and white the kingdom of Prussia. The merchant flag is red, white and black.

Austria-Hungary.— The Imperial standard is yellow of a deep tint, bearing a black double-headed eagle,— an evolution from the eagle standard of the Roman Empire. The warship flag, created in 1786, has three equal horizontal bars of red, white and red with a crowned shield (the ancient device of the dukes of Austria) similarly divided.

Spain.— The royal standard is entirely occupied with the quarterings of the Spanish escutcheon armorially displayed. The naval flag has two broad bands of red with a yellow bar between, on which appears the Castle of Castile and the Lion of Leon, the ancient kingdoms whose union marked the origin of Spain. The merchant flag is yellow, with two horizontal bars of red crossing it.

Russia.— The Russian Imperial standard displayed the black double-headed eagle bearing on its breast a shield with Saint George slaying the dragon, and arms of several Russian cities. The naval ensign had a blue saltire on a white ground. The merchant flag is a horizontal tricolor of blue, white and red.

Japan.— The standard has a gold chrysanthemum with 16 petals on a red field. The naval flag is a representation of the rising sun — a red central disc with alternate red and white spreading rays. The merchant flag is white with a red disc in the centre.

China.— When the Chinese Empire gave place to a republic, the old standard — an ancient dragon on a yellow field — was abolished, and a national design adopted, five equal stripes of colors horizontal, representing China proper, Manchuria, Mongolia, Tibet and the Mohammedan races.

Other National Flags.— Abyssinia.—Three stripes, upper green, centre yellow, lower red.

Albania.— Red field, upon which is imposed a black double-headed spread eagle.

Argentina.— Three stripes, the upper and lower are blue and the centre one, upon which is imposed a golden face.

Belgium.— The vertical tri-color, black, yellow and red, the ancient colors of Brabant, is flown by Belgium. This, with the royal arms, on which the shield is the golden lion on black of Brabant, is the standard; and without the arms, it is the flag of warships and mercantile vessels.

Bolivia.— Three stripes, upper red, centre yellow, lower green.

Brazil.— Green field triangle of yellow; the blue disc in centre represents the heavens, and the white stars add to its celestial representation. Motto: «Ordem e Progresso.»

Bulgaria.— Three stripes, upper white, centre green, lower red.

Chile.— Two stripes, white above and red below, in a blue union a large five-pointed star in white.

Canada.— Same as British, except that it has the Dominion shield in lower fly end. All British colonial flags contain the colonial badge in the fly end of the British flag.

Colombia.— Upper half yellow, lower half blue and red, in centre the shield of Colombia.

Costa Rica.— Five stripes in this order, blue, white, red, white and blue.

Cuba.— At staff end a red triangle, upon which is blazoned a white star and five stripes stream from triangle; these are alternate blue and white.

Denmark.— The flag, the ancient Dannebrog, red with a white cross, and one of the oldest in continuous use, is a memorial of the wars against the Norsemen and Slavs. It is traditionally believed to have been adopted after the appearance of a cross in the sky at one of the battles of Waldemar in 1219. The standard and man-of-war ensign are swallow-tailed; the merchant flag is like the ensign, but rectangular.

Ecuador.— Three stripes, yellow, blue and red, with national arms on the blue stripe.

Greece.— The standard is a white rectangular cross on dark blue, with the royal arms in the centre, the shield of which has the Danish giants as supporters, with a white rectangular cross on a blue field. The naval ensign has nine horizontal stripes, blue and white alternating; the upper quarter next the staff is blue, with a white cross, in whose centre is a crown. The merchant flag is similar, minus the crown.

Guatemala.— Three vertical bars of blue, white and blue, upon the white the national device.

Hayti.— Two stripes, upper blue, lower red, supporting white square, upon which, in green, appears the coat of arms of that country.

Honduras.— Three stripes, upper and lower blue, centre white, with national arms on the white stripe.

Liberia.— Eleven stripes, alternate red and white with a union of blue, upon which appears a large white star.

Luxembourg.— Three stripes, top red, centre white, lower blue.

Mexico.— Three vertical bars, green at staff, red at fly end and white in centre, upon which appears the national arms.

Monaco.— Smallest nation on earth (eight square miles), the flag is white, in the centre, shield of the nation.

Montenegro.— Three stripes, upper red, centre blue and lower white. On centre the national shield appears.

Morocco.— A plain red flag.

Netherlands.— When Holland came into existence as an independent state in 1579, the colors of the House of Orange were adopted; but probably due to the fugitive nature of orange dye in the sea atmosphere, it was altered in 1643 to horizontal red, white and blue. The standard bears the royal arms, the shield being occupied by the Lion of Nassau. The arms are not displayed on naval and merchant vessels.

Nicaragua.— Three stripes, upper blue, lower blue, centre white with national device.

Norway.— Red swallow-tailed field with blue cross.

Panama.— Quartered; 1st quarter white with blue star, 2d quarter red, 3d quarter blue, 4th quarter white with red star.

Paraguay.— Three stripes, red at top, white at centre and blue below.

Persia.— White with two borders, the inner one green, the outer one red. In the centre of the white field is golden lion.

Peru.— Three vertical bars, staff side red, fly end red, centre white, with national shield in the centre.

Portugal.— Prior to the Revolution of 1910, the colors were blue and white. The republican ensign is green and red vertical with the shield framed in an armillary sphere.

Rumania.— Three vertical bars, blue at staff, red at fly end, and yellow in the centre, upon which appears the national shield.

San Domingo.— Quartered by white cross, 1st quarter blue, 2d red, 3rd red, 4th blue; in centre, national device.

Serbia.— Three vertical bars, top red, centre blue, lower white; in centre to overlap the three stripes, the shield of Serbia.

Siam.— Red with white elephant.

Sweden.— Blue swallow-tailed field, charged with cross of yellow.

Switzerland.— Red field with white cross.

Turkey.— The device on the Imperial standard consists of the ruler's name, with the motto "Ever Victorious." The Crescent, which appears on the national and mercantile flags, was the device of Constantinople in the time of the Greek Empire. The naval flag is red, charged with a decrescent moon, and 8-pointed star, both white. The merchant flag is green, with a red circle in the centre, on which is a white decrescent moon.

Uruguay.— Nine stripes, alternate white and red, union with golden sun.

Venezuela.— Three vertical bars, top yellow with national shield, lower red, centre blue, charged at staff side with stars.

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FLAGSTAFF, Arizona, an important railroad town in Coconino County, on the Atchison, Topeka and Sante Fe Railroad. It has an altitude of 6,935 feet. The town has extensive live-stock and lumber interests. Tourists going to the Grand Cañon of the Colorado make Flagstaff their base of supplies. Pop. 1,700.

FLAGSTONE, a rock which splits into slablike masses of various sizes and thickness along the planes of stratification. Consult Ries, ‘Building Stones and Clay Products’ (New York 1912).

FLAHAUT DE LA BILLARDERIE, flăʹō dĕ lă bēʹyärʹdrē, **Auguste Charles Joseph,** COMTE DE, French soldier and statesman: b. Paris, 21 April 1785; d. 1 Sept. 1870. His father, the Comte de Flahaut, was beheaded in 1793 and his mother, afterward Madame de Souza, took him to England. He was generally regarded, however, as the offspring of his mother's liaison with Talleyrand, who befriended him through life. In 1798 he returned to France, entered the army in 1800, and was commissioned lieutenant after Marengo. He formed a liaison with Hortense de Beauharnais and their son, the Duke of Morny, was born 21 Oct. 1811. Flahaut distinguished himself in the Russian campaign of 1812, and was made general of division in 1813. He submitted to the new government in 1814 but was retired in that same year. He was present at Waterloo and sought to place Napoleon II on the French throne. Talleyrand saved him from exile, but Flahaut soon removed to England, where he married Lady Keith. He returned to France in 1827 and three years later was made lieutenant-general and peer of France by King Louis Philippe. He was appointed Minister to Berlin in 1831 and to Vienna in 1841. He remained at the latter post until 1848 when he was dismissed and retired from the army. After the *coup d'etat* of Napoleon III in 1851, Flahaut again came into prominence, helping to draw up the constitution of 1852. He became senator in 1853 and in 1860-62 was Ambassador to England. Consult Haricourt, A de, ‘Madame de Souza et sa famille’ (Paris 1907).

FLAIL, a farm implement used for threshing oats, barley or wheat. It is made of a short stick or club called the "swipple" which is attached by a leather thong to a wooden handle in such a way that it may be swung freely by the operator who grasps the handle. In the Middle Ages an adaptation of this implement was used in warfare.

FLAMBARD, flamʹbärd, **Ranulph** or **Ralph,** Norman prelate and statesman: d. 5 Sept. 1128. Of obscure parentage, in his youth he became connected with the Conqueror's court and being handsome, clever and unscrupulous, gained great influence with the king and rose to still greater favor with Rufus, whom he encouraged in his tyrannical and rapacious courses. His flagrant extortions earned the hatred of the people, and his character is painted in the blackest characters by the chroniclers. In 1099 he was made Bishop of Durham; but on the death of Rufus he was committed to the Tower by Henry I. He managed to escape, however, by means of a rope conveyed to him in a vessel of wine and instigated Robert, Duke of Normandy, to invade England. He was subsequently forgiven by Henry and restored to Durham, where he spent his last years absorbed in architectural works connected with the city and the cathedral. Consult Freeman, ‘William Rufus’ (1882); Stubbs, ‘Constitutional History’ (Vol. I, 1897).

FLAMBOROUGH (flamʹbŭrʹ-ō) **HEAD,** a bold promonotory of England, on the Yorkshire coast, forming the north horn of Bridlington Bay, 18 miles southeast of Scarborough. On its summit a lighthouse, 214 feet above high water, shows an alternating flashing light which is visible 25 miles. Vast caverns, haunted by myriads of sea-fowl, penetrate deeply through this headland. For the battle of Flamborough Head, see JONES, PAUL.

FLAMBOYANT, a term applied to the decorated and very ornamental style of architecture of French origin, usually designated as the late French Gothic architecture, and employed in France contemporaneously with the Perpendicular style in England. One of the most striking and common features is the waving and somewhat flame-like arrangements of the tracery of the windows, panels, etc. The Church of Saint Maclou, Rouen, erected 1432-1500, is said to be one of the finest specimens of this style. Other characteristic specimens are to be seen on the western part of the Cathedral of Tours, the Cathedral of Saint Pol de Léon, Saint Wulfran at Abbeville, Saint Riquier near Abbeville and the Church of Broug at Broug-en Bresse. Consult Enlart, C., ‘Origine Anglaise du Style Flamboyant’ (in *Bulletin Monumental,* Vol. LXX, p. 38, Paris 1906); Jackson, Sir T. G., ‘Gothic Architecture in France, England and Italy’ (2 vols., Cambridge 1915); Martin, C., ‘L'Art Gothique en France’

(Paris 1911–14); Saint-Paul, A., 'Les Origines du Gothique Flamboyant en France' (in *Bulletin Monumental*, Vol. LXX, p. 483, Paris 1907); West, G. H., 'Gothic Architecture in England and France' (London 1911).

FLAME, the phenomenon exhibited when gas or a gaseous mixture is actively undergoing combustion. Solid bodies (such as coke) which do not contain inflammable volatile constituents, that is, constituents which become gaseous and ignite upon the application of heat, become incandescent when they burn, but their combustion is not attended by the development of flame. The flames that appear to issue from such solid combustibles as wood and coal are in reality attendant upon the combustion of gases distilled from the fuel by the heat, as may be very easily proved by subjecting these bodies to the same temperature in closed vessels which prevent the access of air. Abundant quantities of combustible gases are then given off and these may be led away in pipes or stored in tanks, to be burned at more convenient times or places. The gas obtained from coal in this way has been used for many years for lighting through the luminous flame with which it burns. Flames are usually very hot and luminous, though in some cases there is but little light developed. The flame of an alcohol lamp, for example, is barely visible, although it is intensely hot; and the flame of burning hydrogen is an even more striking case of the same sort. (See also PHOSPHORESCENCE). The luminosity of flames is due in some cases to the incandescence of tiny particles of solid carbonaceous matter that they hold in suspension; in the majority of instances, however, the luminosity of the flame is due to incandescence of some gas at a very high temperature. Experiments have demonstrated that luminosity of a flame depends on the density of the gases which are present in the flame and that flames which are but feebly luminous in an atmosphere of normal pressure become luminous when the burning gases are compressed. Even the hydrocarbon flames owe their luminosity not to the solid particles of carbon present, but to the glow of dense hydrocarbon vapors. A pertinent instance is that of the contrary phenomenon of the loss of luminosity of a candle flame when placed in a situation where the normal atmospheric pressure upon it can be considerably reduced.

In studying the action which takes place in a flame the round type has been found simplest in structure — that is, the flame issuing from a round pipe. The flame in such case is conical. This is due to the fact that the cylinder of flowing gas burns only on the outside — where it is in contact with the air. The gas on the inner section of the flame has to travel farther before it meets the air, and the central part of the flow gets to the farthest point. The flame then is a hollow cone of combustion, filled with gas which has not yet burned because it is not in contact with oxygen. It is the incandescence of this inner gas which produces the light. On the other hand it is the outer shell of actual combustion which produces the heat. It is a common experiment in physics to conduct the gases from the interior of the cone of a candle flame by means of a small glass tube to a distance of a few inches away from the flame and to ignite them as they issue from the tube. When a piece of wire gauze is brought down over the flame of a candle, the gauze permits the gases that arise from the wick to pass through it, but it conducts away their heat so that they are no longer capable of combining with one another and hence the flame does not extend above the gauze. That the gases developed at the wick really rise up through the gauze is easily proved by igniting them with a burning match. A certain degree of heat is needed to cause gas to ignite and burst into flame, but with most inflammable gases, once they are ignited the heat evolved in their combustion is sufficient to continue the condition of flame. The ignition points of some of the commoner combustible gases are as follows — in degrees Fahrenheit: hydrogen sulphide, 685°; acetylene, 800°; ethylene, 1,000°; ethane, 1,060°; hydrogen, 1,085°; carbon monoxide, 1,200°; methane, 1,300°; cyanogen, 1,550°. The temperatures of some of the flames used in the industries as sources of heat are: acetylene, 3,114°; alcohol vapor (with air), 3,384°; coal gas with air — in the Bunsen burner, 3,400°; hydrogen, with air — in the Bunsen burner, 3,452°; oxygen-coal gas blowpipe, 3,992°; oxyhydrogen blowpipe, 4,388°; alcohol blowpipe, 4,618°; oxy-acetylene blowpipe (about), 5,700°. See also EXPLOSION.

Flames may be colored, and often very brilliantly, by the presence within them of certain metallic salts. Thus sodium compounds produce a strong orange-yellow color, potassium a violet and strontium a crimson. Advantage is taken of this fact for the production of gorgeous color effects in pyrotechny (q.v.). In chemical analysis, too, the color that a given substance yields when placed in a hot but normally non-luminous flame often gives valuable information concerning its composition. See BLOW-PIPE ANALYSIS; SPECTROSCOPE.

FLAME-FLOWER. See TRITOMA.

FLAMEL, fla'mĕl', **Nicolas**, French alchemist and scrivener: b. probably at Pontoise, about 1330; d. Paris, 1418. He practised his art in Paris and was made scrivener to the university there. He established a school for the teaching of penmanship, illumination of manuscripts, etc., and by this means and probably also through money-lending, amassed a large fortune, which the people believed to have been gathered by his skill as alchemist. He wrote treatises on alchemy in which he detailed his supposed discoveries in turning baser metals into gold. The real facts were first disclosed by Vilain in 'Essai sur l'histoire de Saint-Jacques-la-Boucherie' (1758) and 'Histoire critique de Nicolas Flamel et de Pernelle sa famme recueillie d'actes anciens qui justifient l'origine et la médiocrité de leur fortune contre les imputations des alchimistes' (1761).

FLAMEN, flā'men, a priest of ancient Rome consecrated to the service of a particular divinity. They are said to have been established by Numa and were at first three in number: *flamen Dialis*, the priest of Jupiter; *flamen Martialis*, the priest of Mars, and *flamen Quirinalis*, the priest of Romulus. These three constituted the *flamines majores*, and were always of the patrician class. Later twelve *flamines minores* were created, chosen from the plebeians. The *flamines* held office for life, but were removable for neglect of duty or contamination and were required to resign and remain single upon the death of their wives, the *flaminica*, who assisted them in their duties and were governed by the same rules as their husbands. The *flamen* was distinguished by the *apex*, a conical cap in the top of which was fastened a pointed twig of olive wood bound at its base with a lock of wool. He was not required to take an oath, was an ex-officio member of the Senate, was entitled to the use of the *toga prætexta* and the curule chair. He was entitled to the assistance of a lictor and for himself and for his house held the right of sanctuary and of pardon. He could not leave the city for a single night or sleep out of his own bed for three consecutive nights, mount or touch a horse, touch a dead body or engage in a long list of occupations that were considered to contaminate him. The flamens were selected by the Pontifex Maximus from three candidates nominated by the pontifices. When the emperors were deified they had flamens, as the *flamen Augustalis*. There were also *flamines curiales* and a *flamen arvalium*. The principal duty of the *flamines* was to offer daily sacrifices; on 1 October the three *flamines majores* were required to drive to the capitol and to offer sacrifices to *Fides Publica*, the Honor of the People. Consult Bouché-Leclercq, A., 'Les pontifes de l'ancienne Rome' (Paris 1871); Greenidge, A. H. J., 'Roman Public Life' (London 1901); Marquardt, J., 'Romische Staatsverwaltung' (Leipzig 1885); Samter, E., 'Flamines' (in Pauly-Wissowa, 'Real-Encylopädie der Classischen Altertunisurssenschaft,' Vol. VI, Stuttgart 1907).

FLAMENG, François, frạṅ-swă flă-mạṅ, French painter: b. Paris, 1856. He began his art studies under his father, Léopold Flameng (q.v.), the engraver, and studied subsequently under Cabanel, Hédouin and Jean Paul Laurens. In 1879, after winning the Prix de Salon, he went to Italy for further study. In 1899 he won the Grand Prix. He is an officer of the Legion of Honor, a member of the French Institute and in 1905 became a professor at the Ecole des Beaux-Arts. He lives in Paris. An artist of distinguished ability as a figure painter, he has used this ability with great effect in his many historical paintings. In more recent years he has become especially noted by his brilliant portraits of well-known personages and of beautiful women. Pictures by him are in the museums of Beaune, Liege, Rouen, Sydney (Australia), and in the Luxembourg. He has also done a great deal of decorative work in public buildings in Paris (Sorbonne, Opéra-Comique) and elsewhere, proving that he is one of the most versatile of modern French artists. Among the most striking works of his are: 'Le Lutrin' (1877); 'Barbarossa Visits the Tomb of Charlemagne' (1878); 'The Girondins Summoned' (1879); 'The Conquerors of the Bastille' (1881); 'Camille Desmoulins' (1882); 'The Duel' (1883); 'The Massacre of Machecoul' (1884); 'The Bowlers' (1885); 'C'est lui' (1893); 'Waterloo' (1898); 'The Flight into Egypt' (1900); 'Eylau'; etc. One of his pictures, 'Grolier in the House of Aldus' is in the Grolier Club of New York. Consult Cain, G., 'François Flameng' (in *Art Journal*, Vol. XLIII, p. 65, London 1891); Flameng, F., 'My Way of Work' (in *Cosmopolitan Magazine*, Vol. XLVIII, p. 408, New York 1910); Hamerton, P. G., 'François Flameng' (in *Scribner's Magazine*, Vol. XVI, p. 63, New York 1894); Thompson, V., 'François Flameng' (in *Cosmopolitan Magazine*, Vol. XLVIII, p. 402, New York 1910); also a number of articles in a special issue of *Figaro Illustré* (Année XVI, No. 104, Paris 1898).

FLAMENG, Léopold, French engraver: b. Brussels 1831; d. 1911. He studied at Brussels under Gigoux and Calamietta, went to Paris in 1853, where at first he met with little success. He joined the staff of the *Gazette des Beaux-Arts* in 1859 and in the pages of that journal soon made his ability widely known and acquired the reputation of one of the foremost engravers of the time. His versatility was remarkable; he received a medal of honor in 1886, first prize in 1900. He was an officer of the Legion of Honor. His best works are: 'The Artillery Charge,' after Schreyer, Gerôme's 'Phryne'; Gainsborough's 'Blue Bay' and 'Miss Graham'; Ingres' 'The Source'; Rembrandt's 'Hundred Florin Piece' and 'Night Watch'; Schoen's 'Death of the Virgin'; and 40 etchings for Blanc's 'Œuvres complets le Rembrandt' (1859) and etchings for 'Théâtre complet de Molière' (1873).

FLAMINGO, flă-min'gō, a peculiar web-footed bird of the group *Phœnicopteri*, which may be regarded as intermediate between the storks and the ducks, the long legs and necks giving it a resemblance to the former, while the webbed feet connect it with the latter. There are six species of true flamingoes, widely spread over the warmer regions of both hemispheres. Our North American species (*Phœnicopterus ruber*), once common all along the southern shores of the United States, but now almost exterminated even from Florida and ranging southward to Argentina, is light vermilion with brighter wing coverts. The other forms are rosy white (scarlet on the wing coverts) with black wing-quills. All have small goose-like bodies, but the long legs and neck give them a height of four or five feet. Their most extraordinary part is the bill, which is large, swollen and bent upon itself so that the upper half is turned downward when the bird feeds, with its head twisted and crown downward. The edges of both upper and lower jaw are furnished with small transverse plates, which serve, as in ducks, for a seive, allowing the escape of the mud, but retaining the small worms, crustaceans, mollusks, fishes, etc., on which the birds feed. The upper surface of the tongue is beset on the sides and base with flexible, recurved, horny spines. Flamingoes live and migrate in large flocks, warning one another of danger by a loud trumpeting note, which is the signal for the flock to take wing. When flying, they form a triangle.

They breed in companies in mud-flats or inundated marshes, where they spend most of their time wading about, raising up the mud into a small hillock, which is concave at the top so as to form a nest. In this hollow the female lays her one egg and hatches it by sitting with her legs doubled up under her. The young, usually two in number, do not fly till they have nearly attained their full growth, though they

FLAMINGO (*Phœnicopterus antiquorum*)

From a Photograph provided by the American Museum of Natural History

can run very swiftly and swim with ease almost immediately after their exclusion from the shell. This bird was held in high repute among the luxurious Romans; and Apicius, so famous in the annals of gastronomy, is recorded by Pliny to have discovered the exquisite relish of the flamingo's tongue and a superior mode of dressing it. When taken young they soon grow familiar, but they are not generally found to thrive in the domesticated state. The European flamingo (*P. roseus*) is abundant in marshy regions of Spain and southern France and is found as far south as Cape Colony and as far east as Lake Baikal. In northwestern India it may be seen in flocks numbering tens of thousands. Another very similar species (*P. minor*), but of less size and with the chin feathered, is found from Madasgascar around the whole circuit of the shores of the Indian Ocean. Three other species are known in South America, *P. andinus* of the central Andes, the largest of the family; *P. jamesi*, of southern Peru and Chile, and *P. chilensis* of the region south of Brazil, which has greenish shanks. In addition to the various ornithologies, the reader may consult an article by H. A. Blake, 'Nineteenth Century' (December 1887); Chapman and Buck, 'Wild Spain' (1893); and F. M. Chapman, 'Bird Lore' (1902).

FLAMINIAN (flā-min'i-an) **WAY (Via Flaminia),** the most important northern road which led from ancient Rome toward the Po valley, the Alps and the Roman colonies beyond. It was constructed by Caius Flaminius the elder in 220 B.C. during his censorship and led through Etruria and Umbria, from Rome to Ariminum (Rimini) on the Adriatic, 222 miles. It was restored by Augustus and both Vespasian and Trajan were responsible for improvements of it. It started from the Porta Ratumena, between the Capitoline and the Quirinal (now Via di Marforio). Remains of it are yet extant in various places. Consult Bormann, E., 'Corpus Inscriptionum Latinarum' (Vol. XI, part 2, p. 995, Berlin 1893, etc).

FLAMININUS, Titus Quinctius, tī'tus kwin'-shi-us flam-ĭ-nī'nus, Roman general: b. about 230 B.C.; d. about 175. He was a member of a well-known patrician family. Elected consul in 198, he undertook the conduct of the war against Philip V of Macedon. By pretending that his object was to remove from Greece the Macedonian yoke, he detached many of the Greek states from Philip and defeated him at Cynoscephalæ (197) in Thessaly. By the treaty soon after concluded Philip surrendered all the Greek towns which he possessed in Europe and Asia, and paid a heavy contribution to the Romans. At the Isthmian games in 196 Flamininus proclaimed, to the great joy of the assembled Greeks, the freedom of those states which had been subdued by Macedon. In 195 he diminished the power of the tyrant Nabis of Sparta. In 192 he was again sent to Greece where, thanks to his tact and diplomacy, he succeeded in preventing the Greek states from allying themselves to Antiochus III of Syria, whom the Romans were then fighting. In 189 he occupied the censorship and in 183 was sent to Bithynia, where he accomplished negotiations resulting in a promise to deliver to the Romans the person of Hannibal. The latter, however, committed suicide before the promise could be carried out. Plutarch has written his life. Consult Gerlach, F. D., 'T. Quinctius Flamininus' (Basel 1871); Mommsen, T., 'History of Rome' (trans. by W. P. Dickson, 5 vols., London 1894); Niese, B., 'Geschichte der Griechischen und Makedonischen Staaten, etc.' (3 vols., Gotha 1893–1903).

FLAMINIUS, Gaius, ka'yus, Roman general and statesman, belonging to a prominent plebeian family: d. 23 June 217 B.C. He was tribune of the people in 232, consul in 223 and 217, and censor in 220. As tribune he carried against the opposition of the Senate an agrarian law. In his first consulship he with his colleague, P. Furius, attacked the Gauls beyond the Po, and was defeated. The Senate then recalled the consuls, but Flaminius resisted the order by refusing to open the letter and obtained a victory over the Insubrians. A triumph was refused him on his return, but he was rewarded with demonstrations of popular favor. The circus Flaminius and via Flaminia (q.v.) were the monuments of his censorship. In his second consulship he marched against Hannibal and rashly giving battle, was, together with most his forces, slain near Lake Trasimenas. The principal sources for his life, etc., Livy and Polybius, are considerably biased, both of these writers belonging to the opposite political party. Consult Münzer, F., 'C. Flaninius' (in Pauly-Wissowa, 'Real Encyclopädie der Classischen Altertums-Wissenschaft,' Vol. VI, Stuttgart 1907).

FLAMMARION, Camille, kä-mēl flä-mä-rē-ôṅ, French writer on astronomy: b. Montigny-le-Roi, Haute-Marne, 26 Feb. 1842. In 1858 he entered the Paris observatory as pupil, being transferred in 1862 to the Bureau des Longitudes, where he remained till 1866. Although still a youth, he had already published the first of his many works, namely 'La Pluralité des Mondes habités' (1862; 36th ed. 1892); 'Les Mondes imaginaries et les Mondes réels' (1865; 21st ed. 1892); and 'Les Merveilles Célestes' (1866; 7th ed. 1881). For five years from about 1868 he made a study of the upper regions of the atmosphere during several balloon ascents. In 1882 he founded the monthly magazine *L'Astronomie*, and in 1887 started the French Astronomical Society. M. Flammarion has gained considerable fame for original researches in astronomy, especially in connection with double and multiple stars, colors of stars, the topography and physical constitution of Mars and the moon; sun-spots, and the proper motion of the stars; but is much better known for his excellent, well-written and accurate popular hand-books. Among his other works are 'Etudes et Lectures sur l'Astronomie' (1867–80); 'Dieu dans la Nature' (1867; 22d ed. 1892); 'Lumen' (1872; 40th ed. 1890); 'Voyages en Ballon' (1870; 20th ed. 1889); 'Vie de Copernic' (1872); 'L'Atmosphère' (1872); 'Histoire du Ciel' (1873); 'Petite Astronomie' (1877); 'Les Teres du Ciel' (1877); 'François Arago' (1879); 'Astronomie Populaire' (1880); 'Les Etoiles et les Curiosités du Ciel' (1881); 'Le Monde avant la Création de l'Homme' (1886); 'Les Tremblements de Terre' (1886); 'Uranie' (1889); 'Qu'est-ce que le Ciel' (1891); 'La Planète Mars et ses Conditions d'Habitabilité' (1893); 'La fin du Monde' (1894);

'Astronomy for Amateurs' (1904); 'Thunder and Lightning' (1906); 'Mysterious Psychic Forces' (1907).

FLAMMENWERFER, or **FLAME THROWER.** See LIQUID FIRE.

FLAMMOCK'S REBELLION, an insurrection led by Thomas Flammock, which occurred in Cornwall in June 1497. The insurgents resisted a tax levy for the expenses of the war with Scotland. The insurgent forces were defeated on Blackheath, 17 June 1497.

FLAMSTEED, John, English astronomer: b. Denby, near Derby, 19 Aug. 1646; d. Greenwich, 31 Dec. 1719. He began his mathematical and astronomical studies at an early age, and was in constant correspondence with scientific men. He found the astronomical tables of the day to contain large errors, and was anxious to make more detailed and accurate observations. This having come to the knowledge of Charles II he was appointed astronomical observer to the king (the first astronomer royal) in 1675 and carried on his observations at the Queen's House at Greenwich, until the observatory was built for him in the following year. Here he passed the remainder of his life amidst his astronomical labors, which are considered as the foundation of modern practical astronomy. He was so ill supported that he had to teach for his own support, and erect instruments at his own expense. In the same year in which he was appointed astronomer royal (1675) he took orders in the Church of England, and in 1684 he was presented with a small living, and his father dying in the same year, he was enabled to provide some needful apparatus at his own expense, which, on his death, was claimed by the government as public property. His later years were somewhat embittered by a quarrel with Newton and Halley. In his 'Historia Cœlistis Britannica' (1723) he gives an account of the methods and results of astronomical observation nearly up to his death. Consult F. Baily's 'Account of the Rev. John Flamsteed' (1835).

FLANAGAN, John, American sculptor: b. Newark, N. J., 1865. He studied under Augustus St. Gaudens at New York and under Henri Chapu and Alexandre Falguière at the École des Beaux-Arts, Paris. He executed the monumental clock for the library of Congress, Washington, the statue of Joseph Henry and decorative groups for the Saint Louis Exposition of 1904, the tinted marble relief 'Aphrodite' in the Knickerbocker Hotel, New York, memorial relief of S. P. Langley, in the Smithsonian Institution, four panels in granite for Chicago City Hall, commemorative medal to Dr. Daniel Garrison Brinton, Philadelphia, the Hayden gold medal of the Philadelphia Academy of Natural Sciences, three reliefs for the interior of the Scroll and Key Society at Yale University, a high relief in bronze for the free public library of Newark, N. J., and a marble bust of William Thomas Corlett. He was awarded silver medals at Paris in 1900, Saint Louis 1904, medal of honor at San Francisco exposition of 1915. He is represented in the French national collection of living artists in the Luxembourg.

FLANDERS, Henry, American lawyer: b. Sullivan County, N. H., 13 Feb. 1826; d. 1911. He was educated at Kimball Academy and at the Newbury Seminary, studied law, and after 1850 practised his profession in Philadelphia. He published 'Maritime Law' (1852); 'The Law of Shipping' (1853); 'Lives of the United States Chief Justices' (1855–58) which contains excellent biographical sketches of Jay, Rutledge, Cushing, Ellsworth and Marshall, and has long been a standard work; 'Memoirs of Richard Cumberland' (1856); 'Life of John Marshall' (1905); 'An Exposition of the Constitution of the United States' (1869); 'Law of Fire Insurance' (1871); 'Adventures of a Virginian.'

FLANDERS (French, *Flandre;* German and Flemish, *Flandern;* Dutch, *Vlaandtren*), a former country or district of Europe, now included in the Holland province of Zeeland, the Belgian provinces of East and West Flanders, and French Flanders, comprising the departments of the Nord and Ardennes. It stretched from the Schelde, below Fort Lillo, west along the Hond, or West Schelde, and west-southwest along the German Ocean to the entrance of the Straits of Dover, near Gravelines, and was bounded east by the duchy of Brabant, south by Hainaut, and west by the French provinces of Artois and Picardy. At the time of Cæsar's conquest of Gaul the country was occupied by the Atrebates, Morini and other tribes of Celtic origin. Later the country was invaded by the Germans and it finally passed to the Franks. When Charlemagne's empire was broken up in 843, by the treaty of Verdun, the Scheldt was made the boundary between Lothaire's kingdom of East Francia (Austrasia) and that of Charles the Bald or West Francia (Neustria). In 855 the northern part of Austrasia passed to Lothaire II, after whom it became known as Lotharingia, or Lorraine. Baldwin of the Iron Arm emerges as the first strong ruler of Flanders. He married Judith, daughter of Charles the Bald, and widow of Ethelwulf of England. From Charles he received the margravate of Flanders as a hereditary fief. He defended the country from the Norsemen, who at that time were making frequent incursions southward. Baldwin II, his son and successor, was equally successful in repelling the northern hordes and by his marriage to Aelfthryth, daughter of Alfred the Great, greatly strengthened his position. About the 10th century the margraves of Flanders became counts. In the following decades the territory of the Counts of Flanders was increased under Baldwin IV, who received from Henry II Valenciennes, Ghent, the land of Waes, and Zealand and who became at the same time a feudatory of the Holy Roman Empire. His son, Baldwin V, extended his power and territory, received from Henry IV the territory between the Dender and the Scheldt as an imperial fief, and the margravate of Antwerp. His daughter, Matilda, became the wife of William the Conqueror. By additions of territory and through commerce the Counts of Flanders were in the 11th and succeeding centuries more powerful and wealthy than many of the kings of Europe. Internal strife for a time hindered development at the beginning of the 12th century, there being in 1127 six candidates for the courtship on the death of Count Charles. Thierry, Count of Flanders, distinguished himself in the Second Crusade in 1146 and retired in 1157. He was succeeded by his son, Philip of Alsace, who did much for the great towns of his dominions, Ghent, Bruges, Ypres, Lille, Douai, etc. He was a wise ruler and sternly repressed all uprisings against his authority. He died in 1191 at Acre during the Third Crusade. He was succeeded by Baldwin of Hainaut, and thus Hainaut was united with Flanders under one ruler. In the following century the growth of the free towns brought a new danger to the supremacy of the Counts of Flanders. Their authority over these communities became merely nominal and some cities did not hesitate to take up arms when they believed their rights invaded. The Flemings even induced Edward III of England to assume the title of King of France and this coupled with his invasion, was the moving cause of the Hundred Years' War. After 1300 Flanders was little more than a French province, the counts being obliged to resort thither for aid in their troubles with the free municipalities. The latter under the leadership of Artevelde became allies of Edward III. Flanders was joined to Burgundy in 1369 under Philip the Bold. Thereafter Flanders was never a separate state. The Burgundian rule was marked by revolts in the towns but these were repressed with a stern hand, especially those of Bruges in 1440 and of Ghent in 1540. The War of Dutch Independence brought ruin to Flanders, which in 1599 came under the rule of Albert and Isabel. In 1633 Flanders came under Spanish rule and in 1648 the northwestern part (Dutch Flanders) was ceded to the United Provinces by Philip IV. In 1659, 1668 and 1679 portions of the south were ceded to France forming the section known as French Flanders. In 1795–1814 Flanders formed part of France and was divided into the departments of the Scheldt and of the Lys. This division corresponds to the modern division into East and West Flanders in modern Belgium. (See BELGIUM, HISTORY; WAR, EUROPEAN). Consult Kervyn de Lettenhove 'Histoire de Flandre' (5th ed., 4 vols., Bruges 1898).

FLANDERS, East (Fr. *Flandre Orientale*), a province of Belgium, bounded north by Holland, east by the provinces of Antwerp and Brabant, south by Hainaut, and west by West Flanders; length, north to south, 34 miles; central breadth, east to west, 32 miles; area, 1,158 square miles. The surface forms an extensive plain, sloping gently eastward. It wholly belongs to the basin of the Schelde, which by itself, its tributaries, and canals connected with them, furnishes ample water communication. Its soil, partly of a sandy and partly of a clayey nature, is so industriously and skilfully cultivated that it has the appearance of a vast garden, and presents one of the richest rural landscapes which anywhere exists. The principal crops are wheat and flax, but almost all the plants which can be grown under the same latitude are cultivated with success. There are no forests properly so called, but owing to the general practice of planting hedge-row trees, there is no want of wood. In general, however, it consists of poplar and other soft-wood trees, and makes only indifferent timber. There are no minerals of any value, but manufactures have made great progress, and all the ordinary, as well as the fine tissues of wool, cotton and flax are well and largely made. There are also numerous tanneries, breweries, distilleries, soap-works, roperies, sugar and salt refineries, etc. The trade includes, in addition to these articles, flax, hops, and oil. For administrative purposes the province is divided into six arrondissements — Gand, or Ghent, the capital; Alost, Audenarde, Termonde, Saint Nicolas and Eecloo. Pop. (est.) 1,134,079.

FLANDERS, West (Fr. *Flandre Occidentale*), a province of Belgium, bounded north and northwest by the German Ocean, west-southwest and south by France, southeast by the province of Hainaut, east by East Flanders, and northeast by Holland; greatest length, north-northeast to south-southwest, 54 miles; greatest breadth, 48 miles; area, 1,249 square miles. The surface is generally flat, but a few low hills occur in the south and east, and a range of sand hills or downs lines the greater part of the coast. The most important crops are flax, both abundant in quantity and excellent in quality; oats, barley, hops, oil-seeds, tobacco, madder, and chicory. The cattle, of all sorts, are of excellent breeds; and fish, poultry and game abound. The most important branch of industry is linen, ordinary and damask. Great quantities of lace also are made, and there are numerous breweries, distilleries, tanneries, dye-works, oil-works, soap-works, salt and sugar refineries, etc. The province is divided into eight arrondissements — Bruges (the capital), Courtrai, Ypres, Furnes, Thielt, Roulers, Ostend and Dixmude. Pop. (est.) 884,777.

FLANDIN, flän-dăṅ, **Eugène Napoléon**, Italian painter and archæologist: b. Naples, Italy, 15 Aug. 1809; d. Tours, France, 1876. He was a pupil in Paris of H. Vernè, and spent much of his time in traveling in Algiers and the Orient. In 1840–41 he traveled with Pascal Coste in Persia and later published with him 'Voyage en Perse' (8 vols., Paris 1844–54). In 1843–45 he traveled with Botta through the country of the Tigris, and illustrated his fellow traveler's 'Monument de Ninive' (Paris 1849–50), with drawings of the sculptures of Khorsabad. He finally made a full artistic exposition of Oriental life in his elaborately illustrated work, 'L'Orient' (Paris 1856–74); and also wrote 'Histoire des chevaliers de Rhodes' (1864). Among his principal paintings are 'The Bridge of Sighs' (1836); 'A View of the Coast of Algiers' (1837); 'View of Stamboul' (1853); 'The Entrance of the Bosphorus' (1855); 'View of Bagdad,' the last in the Marseilles Museum. Other pictures of his are in museums in Caen, Lille, Rouen and Versailles.

FLANDRIANS, or **FLEMINGS**, a subdivision of the Mennonite Anabaptist sect. They arose in the 16th century, and were rigid in their procedure. In 1630 A.D. the majority of them entered into a union, confirmed in 1649, with their more moderate brethren, who were often called Waterlanders.

FLANDRIN, Jean Hippolyte, zhoṅ ē-pō-lēt flän-drăṅ, French historical and portrait painter: b. Lyons, 23 May 1809; d. Rome, Italy, 21 March 1864. He worked under Ingres, and from him he imbibed that love of severe and definite form and that classical feeling which he used for his own ends in his religious painting. In 1832 he won the Prix de Rome by his 'Recognition of Theseus'; and before his five years' residence in Italy was completed he had produced his 'Saint Clair Healing the Blind,' now in the cathedral of Nantes. Henceforward he was mainly occupied with decorative monumental work, though he also executed many admirable portraits. In 1842 he began his great frescoes of 'Christ Entering Jerusalem,' and 'Christ Going up to Calvary,' in the sanctuary of the Church of Saint Germain-des-Près, Paris, deeply impressive works, which already entitled their painter to rank as the greatest religious painter of the century. The choir of the same church he adorned (1846–48) with figures of the Saints and the Virtues. He also decorated the church of Saint Paul at Nimes (1847–49), the church of Saint Martin d'Ainay at Lyons (1855), and painted the magnificent frieze that adorns the church of Saint Vincent de Paul, in Paris, in which is figured a procession of saints and martyrs. In 1855 he began his last great work in the nave of Saint Germain-des-Près, consisting of subjects from the Old and New Testaments, of which some were left uncompleted at his death, at Rome, 21 March 1864. His artistic conceptions were majestic, the embodiment of a spirituality that was somewhat austere and cold. But his place as the greatest religious decorator of the 19th century is assured. His 'Lettres et Pensées,' with a memoir and a catalogue of his works, were issued 1865. Consult 'Lives,' by Poncet (1864); 'Montrard' (1876) and Flandrin (1902).

FLANDRIN, Jean Paul, zhoṅ pōl, French painter: b. Lyons, 8 May 1811; d. 1902. A younger brother of the portrait and historical painter Hippolyte Flandrin (q.v.), and a landscape painter whose compositions are of an ideal character and represent a survival of the classical school of Poussin and Claude. He studied at the École des Beaux-Arts in Lyons, accompanied his brother to Paris, studied with Ingres, and went to Rome in 1834. He exhibited at the Salon frequently and won several medals, but spent most of his life as the assistant of his brother Hippolyte. After the latter's death he finished the decorations of the nave of the church of Saint-Germain-des-Prés from his designs. He was employed independently in the church of Saint-Séverin and the Palais de la Chancellerie.

FLANK, a wing or extremity of a military formation, made up of the companies or regiments on the right and left extremities of the main forces. See TACTICS, MILITARY.

FLANK GUARD, a body of troops sent out to shield a column from a flank attack or to give warning of such an attack. It is in general organized after the fashion of an advance guard. Flank guards will be composed of troops of all arms in the case of large units. They may advance abreast of the column, or may be stationed at favorable positions on threatened flanks, and regain the column after it has passed, returning to their units at the end of the day. Flank guards may be sent out by the advance guard or by the main body. In addition to flank guards, or in place of them, flank patrols may be sent from any of the component elements of the advance guard, rejoining the main column after their mission is accomplished. See ADVANCE GUARDS.

FLANNAN or FLANNEN ISLANDS, or THE SEVEN HUNTERS, a group of small rocky islands in Scotland, in the Outer Hebrides, included in the county of Ross and Lewis, about 15 miles west-northwest of Gallon Head. They are frequented by large numbers of seabirds, and sheep used to be pastured on some of them. There are a number of ancient monuments, and a lighthouse of recent erection, standing at a height of over 200 feet, the structure itself being 75 feet high, with a light visible 24 miles.

FLANNEL, a woolen or cotton fabric of more or less loose texture and various degrees of fineness, much used as an article of clothing both in hot and cold countries, and for outer as well as inner garments, being very commonly worn next the skin. Flannel made in Wales from the wool of the native mountain sheep has the highest reputation.

FLANNEL-MOUTH, a local name for the great Mississippi catfish (*Ameiurus lacustris*). (See CATFISH). Another fish, one of the suckers (*Catostomus latipinnis*) is so called in the neighborhood of the Colorado River.

FLANNEN ISLANDS. See FLANNAN ISLANDS.

FLASHLIGHT, Electric. See FOG SIGNALS.

FLAT, in music, a character (*b*) denoting a tone lower by half an interval than the natural. The word also designates the tone itself marked by such a character, i.e., the flat of B.

FLAT FOOT, or PES PLANUS, a very common deformity of the foot due to a loss of the natural arch. A strong ligament holds the os-calcis and astragalus in such a position that an arch is formed by the bones of the foot and the weight of the body is transmitted through that arch. There is a congenital variety that is said to be due to lack of the normal fatty pad in the hollow of the new born infant's foot. During the first five years of life this fatty pad takes the place of the bony arch and if the pad be lacking the arch does not develop. The acquired variety affects those suddenly called upon to stand for long hours upon the feet. A very large number of nurses, soldiers, waiters and policemen suffer more or less with this deformity in their early months of training. Rickets, knock-knees, sprains and badly set fractures of the leg may give rise to flattening of the arch. Flat-foot is a physical disability which, in most countries having universal military service, is considered to unfit the person affected for military service.

The bones are not changed from their normal shape except in the very young, but their relation to each other is altered. There is also a stretching of the extensor tendons of the foot and the muscles and fascia of the sole. Besides the flattening of the foot there is a more or less marked turning out of the toes and a tendency to walk on the inner side of the foot. This gait becomes quite characteristic.

In the acute cases particularly there is apt to be severe pain in the spring ligament, the inner malleolus or the ball of the great toe. Because of this, the affection is very commonly thought to be rheumatism, gout or disease of the bone.

The normal marking of the sole of the foot is an impression of the heel, a narrow margin of the outside of the foot and a broad line made by the ball of the foot. When the arch becomes weakened there is a gradual increase of the outer margin until almost the whole foot makes its impression. This simple test is of great value.

Congenital flat foot may be greatly improved if discovered in time by manipulative massage, bandaging and the use of supports until the bony arch is formed. Acute cases of flat foot in adults sometimes require rest for a time. Properly made shoes without braces frequently suffice to prevent a return of the trouble. Others require the constant use of felt or well-adjusted steel springs in the shoes. Exercises of the extensors of the foot, massage and electricity are of value.

The bad cases of deformity that cannot be corrected require operation under an anæsthetic, the joints being forcibly freed and kept in normal position by plaster cast for a period and then kept up by a support. Consult Kahler, C. O., 'Our Feet' (New York 1903); Munson, E. L., 'The Soldier's Foot, etc.' (Fort Leavenworth 1912).

FLAT RIVER, Mo., village of Saint Francis County, on the Mississippi River, 65 miles south of Saint Louis, on the Illinois Southern and other railroads. The lead mines of the vicinity furnish the principal occupation of the inhabitants. Flat River lost its charter in 1911. Pop. 5,112.

FLATEYJARBOK, flăt'ĕ-yăr-bŏk ("Diary of Flatey"), a collection of sagas, once preserved in the island of Flatey, Iceland, but at present kept in the Royal Library in Copenhagen. It was written in 1380–95 by two priests of Iceland, and is important as one of the main sources for the Norse discovery of America.

FLATFISH, a fish of the *Heteromomata*, including the families *Pleuronectidæ* and *Soleidæ*, which are characterized by their greatly compressed form, distorted skulls and the habit of lying and moving on the side. They are somewhat related to the cod family, and inhabit the seas of all parts of the world, more than 500 species, classified in some 55 genera, being known to ichthyologists. All are oval or elliptical in outline, very thin and flexible, and habitually rest, half covered, or move sidewise along sandy sea-bottoms, some species near shore or even ascending rivers, others only in deep water. They are carnivorous, taking as food mainly mollusks, worms, sand-dollars and the like, found in such places, for the crushing of whose shells they are provided with strong teeth, chiefly developed on the inferior side of the mouth. The flatness of these fishes is not a broadening laterally but a compression of the body whereby they become high and thin in a dorso-ventral direction, lie over on one side (usually the left), and have the head permanently twisted to the side uppermost in their customary position. This, however, comes about only with age. The very young flatfish are born in the normal shape of fishes, and swim in the ordinary vertical position, but soon begin to assume the adult peculiarities. This tendency causes profound changes in structure. The skull gradually becomes so distorted that its facial part is twisted at right angles to the plane of the cranial part, and both eyes, set close together, look upward, so that the fish has a seeing and a blind side. In order to get into this position the eye of the under side is rotated around, or in some species right through the young skull, when the fry is only an inch or so in length and the bones not yet ossified. The curious condition of the dorsal fin in the flatfish is nevertheless a greater mark of distinction. The external ethmoid bone belonging to the blind side is much enlarged, and sends back a process outside the eye belonging to that side to meet another process from the cranial region of the skull. Thus, says Cunningham, the eye which has migrated is enclosed in a complete bony orbit, while the other (lower) eye is merely bounded on its outer side by the jaw muscles. It is on this bony bridge entirely foreign to the anatomy of an ordinary fish that the dorsal fin is supported, and is able to extend from the tail clear to the snout, not passing between the eyes, but separating the hidden from the exposed side. Similarly the ventral and anal fins form a continuous growth along the ventral keel, defining there the upper side from the lower. The lesser forward fins, like the mouth, are usually asymmetrical. They are able to swim well when they please, and sometimes appear at the surface, progressing with a curious sideways undulatory movement very graceful. This is a dangerous excursion, however, and flatfish as a rule cling to the bottom, trusting to be overlooked because of their close resemblance to the sand or mud.

The young flounder or other species is brown on both sides alike; but when it turns on one side and lies flat, the under side becomes nearly white while the upper assumes the color of the bottom upon which the fish habitually rests. This is an excellent example of protective resemblance (See COLORATION, PROTECTIVE); and that it arises from the habits of the fish and is the effect of persistently keeping the under side in shadow, is plain from the fact, demonstrated by experiment, that when flatfish are confined in aquaria with glass bottoms, through which light is reflected upon the under side, color will develop there. Some flatfish are spotted, increasing their likeness to a pebbly bottom. All these circumstances make it evident that flatfishes originated from symmetrical ancestors related to those of the cod, but what were the inducing causes of the extraordinary changes that have characterized their evolution are not plain. Little help is derivable from palæontology for fossil flatfishes are extremely rare, the oldest known being a sole-like form from the Upper Eocene of southern Europe.

The group includes two families, the flounders (*Pleuronectidæ*) and the soles (*Soleidæ*). Jordan subdivides the former into three sections, namely *Hippoglossinæ*, halibut tribe; *Pleuronectinæ*, flounder tribe; and *Psettinæ*, turbot tribe. The soles are a small family distinguished by the hidden, adnate character of the gill-cover, the small, much twisted eyes and mouth, and the absence of teeth. The whole group yields excellent flesh, and furnishes some of the most important food-fishes of commerce as well as several regarded as especial delicacies. They are treated of at length in Goode's 'Fishery Industries,' Sec. 1 (1884); and in Jordan and Evermann's 'Fishes of North and Middle America' (1898). See Flounder; Fluke; Halibut; Plaice; Sole; Tongue-fish; Turbot.

FLATHE, Heinrich Theodor, hīn'riH tā'ōdōr flä'tē, German historian: b. Tanneberg, near Nossen, Germany, 1 June 1827; d. 26 March 1900. He attended the Fürstenschule in Meissen, studied philology and history in Leipzig and in 1867 was appointed teacher in the Fürstenschule at Meissen. He retired from active life in 1895. He was an indefatigable writer and editor, his special field being Saxon and modern history. His main achievement was the revision and rearrangement of F. W. Bottiger's 'Geschichte des Kurstaats und Königrech's Sachsen' (1867), which he transformed into a new work, for he not merely added new details, but rewrote much of the main argument. He has also among other works written 'Allegemeine Weltgeschichte' (1883); 'Das Zeitalter der Restauration und Revolution 1815–51' (1883); 'Deutsche Reden, Denkmäler zur vaterlandischen Geschichte des 19ten Jahrhunderts' (1893–94). This work, covering the period from 1789 to 1887, has appeared in an English translation in four volumes, comprising vols. XVI–XIX in the 'History of All Nations Series' (Philadelphia 1902).

FLATHEAD, or (properly) **SALISH INDIANS,** a tribe of Indians belonging to the Salishian family to which they gave their name, with uncompressed skulls as distinguished from the "peaked-heads" who did compress their skulls, and who gave the others the name of Flatheads. These Flatheads are a superior tribe, originally dwelling around the Flathead Lake and River in northwestern Montana; much respected by the traders and explorers as at once very brave against their enemies (chiefly the Blackfeet) and honorably requiting friendly treatment. The famous Flathead mission, known as Saint Mary's and located in the Bitter Root Valley, Mont., was one of the most successful in the Northwest and was established among them in 1841 by the Jesuit missionary P. J. De Smet. On 16 July 1855 the Flathead, Kutenai and Upper Pend d' Oreille Indians turned over their lands by treaty to the United States. They were thereafter located there on reservations, the whole territory being known as Flathead Indian Reservation. By various acts, passed since 1904, most of these lands have been opened to settlement, irrigation, etc. In 1909 the number of Flathead Indians was officially given as 598. Consult Baudot, V., 'Au Pays des Peaux-Rouges, etc.' (Lille 1911); Curtis, E. S., 'Indian Days of the Long Ago' (Yonkers 1914); Hodge, F. W. ed., 'Handbook of American Indians North of Mexico' (Smithsonian Institution, Bureau of American Ethnology, Bulletin 30, 2 vols., Washington 1907–10); O'Connor, Jas., 'The Flathead Indians' (in *American Catholic Historical Society of Philadelphia, Records*, Vol. III, p. 85, Philadelphia 1891); Ronan, P., 'Historical Sketch of the Flathead Indian Nation, etc.' (Helena 1890); Smead, W. H., 'Land of the Flatheads, etc.' (Missoula 1905); U. S., Public Lands Committee, 'Flathead Indian Reservation Acts Relating to the Flathead Indian Reservation, etc.' (compiled by C. W. Draper, Washington 1914).

FLATHER, John Joseph, American mechanical engineer: b. Philadelphia, Pa., 9 June 1862. He was graduated from the Sheffield Scientific School of Yale, and after several years' experience in American and foreign machine shops was instructor in mechanical engineering at Lehigh University 1888–91; professor of the same at Purdue University 1891–98; and he has filled a similar post at the University of Minnesota from 1898. He has published 'Treatise on Steam Boilers' (1889); 'Rope Driving' (1892); 'Dynamometers and the Measurement of Power' (1900); 'Kinematics' (1904); 'Transmission of Power' (1908); 'Thermodynamics' (1915), also many contributions to technical journals.

FLATTERY, Cape. See Cape Flattery.

FLATULENCE. See Indigestion.

FLATWORMS, the common name of the phylum Plathelminthes. Some forms (Turbellaria) are free living and widely distributed in salt and fresh waters. Others (Trematoda, Cestoda) are characteristic parasites and the causes of serious diseases in man and other animals. See also Parasitism.

FLAUBERT, flō-bar, **Gustave,** French novelist: b. Rouen, France, 12 Dec. 1821; d. Rouen, 8 May 1880. He was the son of a house surgeon at the Hôtel-Dieu. From his earliest childhood literature was his absorbing passion. At the age of 10 or 11, he wrote scenarios of plays of which nothing but the titles remain, 'The Avaricious Lover,' 'The Ignorant Antiquary,' etc. On his father's billiard table he acted out his own plays with his little sister Caroline and his two chums Ernest Chevalier and Le Poitevin as his mummers. He was obsessed by the desire to write plays, and it is surprising that he did not persevere in that line of work. At a very youthful age he wrote for *Le Colibri*, a theatrical review. His favorite dramatic authors were Victor Hugo and Shakespeare and he patterned after them most carefully. In 1838 and 1839 he wrote 'Smark' and 'The Dance of Death,' in the form of a dialogue or a sort of poem in prose. At that time at the Fair of Saint Romain, a play entitled 'The Temptation of Saint Anthony' was being acted. This made a very decided impression upon his youthful mind for later on in 1845 when in Genoa and gazing at the painting of 'Hell' by Breughel in the Balbi Palace, he conceived the idea for what eventually proved to be one of his masterpieces, 'The Temptation of Saint Anthony.' Upon reaching maturity, however, he became greatly interested in the psychology and sentiments of his time, and to make a close and comprehensive presentation of human motives he realized that the stage was inadequate for the expression of his philosophy.

The legend that Flaubert studied for the medical profession is false. It is based on his profound knowledge and technical documentation of the pathological cases which he described, but it must not be forgotten that his knowledge of every subject which he handled bore the same hall marks of profundity and exactness. Medicine interested him and he read profusely and did an immense amount of research work. Bouilhet, his classmate, who was later in the elder Flaubert's office, helped him greatly in his investigations. Throughout his life Flaubert was quite sincere in an honest indifference to public opinion. His first and greatest book 'Madame Bovary' (1857) achieved a great vogue because of a certain rumor of immorality which kept growing until the matter was threshed out in the law courts of France. It gave the code of the modern naturalistic school, and "the formula of the modern novel," according to Zola. Flaubert was more or less a recluse, residing at a suburban house in Rouen, spending entire months in unremitting study, relieved by an occasional visit to Paris. He hated democracy and the bourgeoisie, and in 'Madame Bovary' he produced the bitterest satire on romanticism. 'Salammbo' (1862) applied the same method to the civilization of ancient Carthage. 'L'Education sentimentale' (1869) was pronounced by Zola "the only true historical novel that I know in which the resurrection of dead hours is absolute, with no trace of the novelist's trade." 'La tentation de Saint-Antoine' (1874) is one of the finest prose works of his time and the best example of dream literature in the world. 'Trois contes' (1827); 'Un cœur simple'; 'La légende de Julien l'hospitalier' and 'Herodias' show a kind of romantic realism connecting as it were the romantic and the naturalistic school. Flaubert's great merit lies in his faultless style and the precision in which his works enunciate a view of fiction which was to guide French novelists for a generation. His 'Bouvard and Pechuchet' is a triumphant denunciation of what he termed "the ineptitudes" of humanity. Flaubert was appointed chevalier of the Legion of Honor in 1866. George Sand visited him frequently. She sent him 75 volumes of her work, and advised him with his plays, securing the acceptance of 'Candio.' He visited London, Brussels and Dieppe in 1870–71, returning to his suburban residence after the restoration of peace. Flaubert's complete works appeared in eight volumes in 1885. (See MADAME BOVARY; SALAMMBO). Consult Albalat, 'Le travail du style' (Paris 1903); Bertrand, L., 'Gustave Flaubert' (ib. 1912); Faguet, 'Flaubert' (ib. 1899); Gaultier, T. de, 'La philosophie du bouvarysme' (ib. 1911); Tarver, 'Gustave Flaubert as Seen in his Works and Correspondence' (London 1895); 'Correspondence de Flaubert' (4 vols., Paris 1873–85).

FLAVIAN I, Saint, patriarch of Antioch: b. probably in Antioch about 320; d. February 404. He inherited considerable wealth, but devoted his riches and talents to the service of the Church. He was ordained priest by the Patriarch Meletius in 361, and succeeded the latter in 381. His election was opposed by the Eustathians who chose Paulinus as patriarch. At length in 398 through the efforts of Chrysostom and Theodosius Flavian was acknowledged by Rome as the legitimate bishop of Antioch, but many of the Eustathians still remained aloof, the schism not being finally healed until 415. Flavian is venerated as a saint in both the Greek and Latin churches. Consult Loof, 'Flavianus von Antiochien' (in Herzog-Hauck, 'Realencyklopädie.')

FLAVIAN II, patriarch of Antioch: d. 518. He was named patriarch by Anastasius I about 498, and at once was involved in difficulties over the acceptance of the Chalcedon decrees. His final course angered Anastasius, who made a pretext of the rioting between the factions in Antioch to depose Flavian in 512. He was banished to Petra, where he died. Soon after his death his name was placed in the roll of Greek saints, and after some opposition he was accorded similar honors in the Latin church.

FLAVIAN, Saint, bishop of Constantinople: d. 449. He succeeded Proclus in 447 and in the following year presided at the council which deposed Entyches, but was himself deposed soon after by the council of Ephesus. His death was attributed to ill-treatment by his opponents. He was canonized as a martyr and in the western church is commemorated on 18 February.

FLAVIAN CÆSARS, the Roman emperor Vespasian and his sons and successors, Titus and Domitian, who were of the house of Flavius.

FLAVIN, a yellow or orange dyestuff. American flavin is got from quercitron bark and is said to be the same as quercitrin.

FLAVORING PLANTS. See HERBS, CULINARY.

FLAX (*Linum usitatissimum*). The use of flax has a greater antiquity than any other commercial fibre. It was cultivated and manufactured by the Swiss lake dwellers in the Stone Age in Europe, well preserved specimens of straw, fibre, yarn and cloth being preserved in the museums. Our name for this cloth, "linen," is derived from the Latin *linum*. This ancient flax, however, was from another species, *Linum angustifolium*. The Egyptians produced and used flax thousands of years ago and the Chaldæans and Babylonians carried its use to the highest state of textile development. Three thousand years ago the Phœnicians extended the culture and the Greeks and Romans made it a household industry, and it became the aristocratic fibre. It is claimed that the ancient Mexicans knew of both flax and hemp, and its culture in this country goes back to the earliest date of our civilization. A bast fibre, it may be considered, next to cotton, the most valuable and universally employed textile in the whole range of vegetable fibres.

While the plant can be grown in nearly every portion of the temperate world, it is produced commercially throughout Europe and in portions of Africa and Asia, Japan and the Australian colonies. It thrives in Canada, the United States and Mexico, and in some of the South American countries. Good flax has been grown as far north as Alaska and the flax of Archangel, in Russia, is famous.

Its cultivation was brought to this country by the American colonists, the records showing that considerable quantities were grown in eastern Massachusetts as early as 1630. Its growth was early extended to other States, though for the most part it was a household rather than commercial industry. In the middle of the last century three-quarters of a million pounds of flax were produced in the United States — Vermont, Connecticut, New York and New Jersey leading in the culture. With the increased use of cotton fine flax culture steadily declined and while, as late as 1869, 13,000 tons of flax were produced, a very small proportion was fine line, the bulk being mere tow for the bagging factories. A year or two later, when jute was admitted free of duty, the industry collapsed. At the present time we are growing flax to the extent of a million acres annually, but for the seed, for linseed-oil manufacture and not for the fibre. The straw, which is rough and coarse, is largely thrown away, although in recent years attempts are being made to use the rough product for paper.

Good commercial fibre could be grown in many localities, notably in Michigan, Wisconsin, Minnesota, Oregon and Washington. In a series of government experiments, conducted by the writer in the Puget Sound region of Washington, flax straw was produced from which was hackled out a fibre valued by experts at $500 per ton. Very little line-flax is produced at the present time, however, our commercial supply coming, previous to the great war, from Russia, Holland, Belgium and Ireland; a little comes from Italy and Canada.

Nearly every country producing commercial flax has established grades and marks, save the United States and Canada. In portions of Russia the grades bear the names of the districts where grown. The grades of Archangel flax are known by the terms first, second or third Crown, etc., and first Zabrack, second Zabrack, while Riga flax is graded from the standard K as HK, PK, HPK, HSPK, etc. French flax is known by the districts where produced and Irish flax by the counties where the flax is grown (consult 'Descriptive Catalogue Useful Fibre Plants of the World,' p. 222).

The culture of flax requires a deep, well-tilled soil, in high state of fertility, such as moist, deep, strong loams upon upland; a wet soil is disastrous and clays are therefore avoided; and a soil filled with the seeds of weeds is equally fatal to flax culture. The land must be deeply plowed and reduced to fine tilth by harrowing and rolling. In the preparation of the soil, especially in Europe, a systematic rotation of crops is practised, flax occupying the same land not oftener than once in 5 or 10 years. Imported Riga seed gives the best results, although Belgian Riga (Belgian seed produced from one sowing of Riga seed) gives a fine fibre. The common seed of the oil-mills should never be used for fibre culture. When flax is grown for the production of seed alone, to be sold to the oil-mills, the ground is seeded at the rate of two to three pecks to the acre. For fibre culture one and a half to three bushels is the proper quantity per acre.

After the seed has vegetated and is about two inches high the weeding begins, for no fine flax can be produced if the crop is choked with weeds. Flax is harvested by pulling the straw out of the ground, roots and all, the straw being laid in handfuls to dry, and afterward made into bundles, which are stacked in the field. Practice varies, however, in different countries as to the handling before the retting period. In Flanders the greatest care is given to drying and storing, in order to keep the flax clean and bright for the final process of retting.

There are three methods of soaking or retting the straw: Dew retting is the simplest and the least careful, the straw being spread over the field like hay, to be retted by the dew and by the action of the elements. Pool retting is practised by immersing the straw in pools of stagnant water, the softest water giving the best results. The pools are dug in the ground for the purpose, though a great deal of the Irish flax is retted in "bog holes." Retting in running water is the third method, this form of retting being practised in Belgium; the famous Courtrai flax is retted in the sluggish and murky waters of the river Lys, the straw, in bundles, being placed in large crates and weighted with paving stones until the crates sink sufficiently to fully cover the flax. The flax of Courtrai, retted in the Lys, is the finest flax in the world. It is very light in color, clean and even, and shows a superior tensile strength. The flax is given two immersions, the straw being taken from the crates and carefully dried before the second immersion.

The first operation in cleaning or extracting the fibre is to pass the straw through a breaker, which loosens the woody portions of the stem, and reduces them to fragments, to facilitate the next operation, the scutching, which whips out the "chive" and all waste matters and leaves the pure flax fibre. In former times the scutching was done by hand, though now machinery is generally used. The scutched flax is subsequently hackled or dressed by repeated combings, which removes the short and broken or tangled fibre, these combings producing tow. Each hackling adds to the quality of the fibre, and of course to the cost. Flax is usually imported in the scutched form, the hackled flax known as "dressed line." The cheaper grades of flax come from Canada and Russia, the medium and finer grades from Holland and Ireland. The product is used in the United States for threads, twine and crash, as no fine linen is woven in America. In 1914 we manufactured about $5,000,000 worth of linen thread, $1,000,000 of linen twine and $3,200,000 of dressed flax and flax tow. Mexico produces some good flax, and there are linen mills in Mexico city which produce fair grades of fabric. For the details of flax culture and manufacture, consult 'Special Reports' (Nos. 1, 4 and 10), office of Fibre Investigations of the Department of Agriculture; 'Spinning the Threads,' by A. R. Turner, Jr., in Jubilee number of 'New York Dry Goods Economist' and 'Etudes sur La Culture le Rouissage et el Teillage du Lin,' by Alfred Renouard. See CORDAGE; CORDAGE INDUSTRIES; FIBRE; LINEN.

CHARLES RICHARDS DODGE,
Commercial Fibre Expert.

FLAX, New Zealand, fibre of the lily-like *Phorminum tenax*, native of New Zealand and Norfolk Island. The fibre is taken from the leaves which attain a length of from 30 to 70 inches and a width averaging about three inches. Before the advent of the whites the New Zealand aborigines used the fibre for dresses, twine, ropes, etc. It has been introduced in California, where it is being successfully grown.

The leaves are cut upon attaining their full size and are next macerated in water, the fibre being then combed out by machinery.

FLAXMAN, John, English sculptor and draughtsman: b. York, England, 6 July 1755; d. London, 7 Dec. 1826. From his earliest years he exhibited and cultivated his talent for designing and was also attracted by the picturesque conceptions of Greek mythology. He began to study at the Royal Academy in 1770, earning for some time a living by making designs for Wedgwood, the potter, and other persons. He went to Italy in 1787 and acquired the highest reputation by three series of designs, the illustrations to Homer, Æschylus and Dante. He became a member of the Royal Academy 1797 and professor of sculpture there in 1810. The monument to Lord Mansfield in Westminster Abbey, the group of ‹Cephalus and Aurora,› ‹Psyche,› the group of the ‹Archangel Michael and Satan,› are among his best works. He executed many exquisite bassirelievi, compositions from Scripture subjects and marked by some special religious sentiment. The monuments to Nelson, Howe and Reynolds in Saint Paul's are by his hand. One of his latest and finest productions is the ‹Shield of Achilles.› The sculptures and sketches of Flaxman are now deposited and exhibited in a gallery called the «Flaxman Hall,» at University College, London. His ‹Lectures on Sculpture› appeared in 1829, and passed through a new edition in 1866.

FLAXSEED, the seed of the flax plant (*linum*) largely used for domestic and medicinal purposes, produced in large quantities in the south of Europe, Egypt, parts of Asia and in the United States. (For a detailed description of the plant see FLAX; and for its commercial qualities other than seed, see FIBRE and LINEN). The seeds of flax are dark brown, glossy, oval oblong, flattened, with acute edges and pointed at one end. The seed is rich in an oil of such superior drying qualities as render it an indispensable ingredient in paint and varnish, and in the manufacture of linoleum, oilcloth, printer's ink, patent leather and other products and manufactures. The cultivation of the plant for fibre requires harvesting before the seed is fully ripe, which impairs the quality and reduces the quantity of the crop of flaxseed. The cultivation of flax for the seed requires a seeding of two or three pecks to the acre, and while it yields an increase of seed, the fibre straw is coarser; hence flax must be raised exclusively either for fibre or for seed. European countries cultivate flax for fibre, while the United States, Argentina and British India produce the world's commercial crop of flaxseed.

Introduction in America.— Flax for fibre was introduced in the United States soon after the landing at Plymouth. The seed for which there was obviously a limited domestic demand, gradually developed as an article of commerce. So long ago as 1791 the exports of flaxseed from the United States amounted to 292,460 bushels. In the same year began the manufacture of linseed oil in this country. In 1810 there were 283 linseed oil mills located in 14 States, 171 mills being in the State of Pennsylvania. The total annual output of these mills amounted to 770,583 gallons, representing 300,000 bushels of seed. In 1839 the first cargo of flaxseed ever brought into the United States was imported from Russia, and a few years later ships carrying ice to India brought flaxseed on the return voyages. From 1850 to 1870 India shipped a larger quantity of flaxseed to the United States than was produced in this country. From 1850 to 1860 half the entire crop here was grown in Ohio and Kentucky. The linseed oil mills divided or arranged themselves about 1891 into two groups, eastern and western. The former utilized the India imports of seed, while the western mills used the home product. In 1892 the United States took rank among the surplus flax-producing nations of the world and became an exporter of importance. In 1894 a short crop necessitated the import of 4,000,000 bushels. After that the crop increased, but recent years show a reduced acreage and production. The acreage and production of flaxseed in the United States fell off greatly after 1914, due to giving the soil to more favored crops. As a result importation increased, being in 1917 12,394,000 bushels valued at $25,150,000.

The Western Crop.— The flaxseed industry has migrated from its original western home in Ohio and Kentucky, until its present area includes North Dakota, South Dakota, Minnesota, Montana, Iowa and Wisconsin (known as the northwestern crop), and in Kansas, Missouri, Nebraska, Oklahoma and Indian Territory (known as the southwestern crop). Up to 1869, Ohio was the leading producing State. In 1879 Illinois produced the largest crop, 1,812,438 bushels. In 1889 North Dakota took the lead with a production of 7,776,610 bushels, and in 1902, out of a total record production in the United States of 29,284,880 bushels North Dakota produced 55 per cent or 15,552,000 bushels. In 1915 its acreage was over one-third of the total United States, and Minnesota's about one-sixth, Montana and South Dakota being the other large producing States. There are two varieties of seed produced in the West. The small-grained seed of the Southwest yields an average of 17 pounds of oil to the bushel, while the larger-grained seed of the Northwest yields 20 pounds of oil to the bushel (56 pounds).

FLAXSEED PRODUCTION IN THE UNITED STATES.

STATES	1915	1916	1917
	Bushels	Bushels	Bushels
North Dakota......	3,764,000	8,137,000	6,534,000
Montana..........	1,266,000	3,088,000	2,625,000
Minnesota..........	1,980,000	1,700,000	3,150,000
South Dakota......	980,000	930,000	1,100,000
Other states........	483,000	441,000	821,000
Total United States........	8,473,000	14,296,000	14,230,000

The great falling off of United States production of flaxseed since 1914 has been accompanied with an almost steady increase in price. From 1890 to 1909 the farm price of flaxseed varied normally between $1 a bushel and $1.50. In 1901 it rose to $1.80, but the bumper crop of 1902 brought the figure down; in 1910 it rose to $2.34 in October, and in 1911 was $2.05. It fell off again in 1912 to 1914; in 1915 stiffened to $1.48, in 1916 during the later months to $2, and steadily rose to the close of 1917, when the usual quotation was $3 per bushel. A large importation from South America resulted.

Flaxseed Products.— The principal product as understood is linseed oil. The residue after the extraction of the oil is the by-product the oilcake, a valuable cattle food, which, when ground, is known to commerce as linseed oil meal. Out of a crop like that for 1909 (39,000,000 bushels), there could be manufactured over 75,000,000 gallons of oil and upward of 1,000,000,000 pounds of oilcake. Of this vast quantity of oil the foreign demand only amounts to 100,000 gallons a year. Linseed oil has many uses and the monopoly of its field is so complete it has no substitutes nor adulterants. Probably 75 per cent of the oil manufactured is compounded with pigments and gums and used as paint and varnish. The remainder is utilized in making linoleum, oilcloth, printer's ink, waterproof fabrics not made of rubber, enamel for buttons, for making soap and for a few medicinal purposes. The oilcake, used only as a cattle food, finds an extensive market abroad. It is highly prized by European stockraisers, but little appreciated in America. In the fiscal year 1909–10 oilcake to the value of $19,251,012 was shipped to foreign countries, but this trade has fallen off. In 1912 there was imported 737,256 gallons, and in 1914 192,282 gallons. In the manufacture of linseed oil from flaxseed two processes are used, one known as the "old" or hydraulic press process, and the other as the "new" or naphtha process. The old process is in use generally throughout the United States, the new process being represented principally by one mill in Chicago. In the banner year of 1902 there were 40 linseed oil mills in operation in the United States. They contained 750 presses with a crushing capacity, if operated 250 days in the year, of 25,000,000 bushels, with an output of 70,000,000 gallons of oil.

FLAXSEED PRODUCTION OF THE WORLD.

COUNTY	1899	1912	1917
	Bushels	Bushels	Bushels
United States.......	19,979,000	28,073,000	8,473,000
Russia.............	18,022,000	22,177,000	....
British India.......	17,116,000	25,680,000	15,440,000
Canada.............	....	26,130,000	....
South America......	8,639,000	23,413,000	40,134,000
Other countries.....	2,592,000	3,000,000	....
Total..........	66,348,000	128,473,000	....

The manufacture of linseed oil in the West has become largely localized in cities on and near the Great Lakes — Minneapolis, Chicago, Toledo, etc. Flaxseed in its natural state has no domestic uses on the farm, so that internal commerce involves the entire crop.

FLEA-BEETLES, small leaf-beetles of the tribe *Halticini*, of the family *Chrysomelidæ*, differing from other forms of this family by their extraordinary leaping power due to the enormously developed hind femora. Many of them are injurious to vegetation from their habit of eating the starting leaves full of holes, causing the drying up and death of the plant; hence certain species are known, as "tobacco flea," "potato flea," "cabbage flea," etc. In their larval state some species live on the root system of various weeds, the adults doing the principal damage to useful plants. Some species are also leaf-miners, while a few feed on the upper surface of leaves like the young of common leaf-beetles, but most species feed on both surfaces. One of the best remedies is bordeaux mixture, doubly efficient when mixed with paris green and administered in the form of a spray. See LEAF-BEETLES.

FLEA-HOPPER, either of two species of injurious minute black bugs of the family *Capsidæ*. The commonest is the garden flea-hopper (*Halticus uhleri*), which feeds and breeds normally on clover, but attacks all garden vegetables, commonly on the under sides of leaves, which it punctures so as to cause the death of the tissue in small irregular white patches. It somewhat resembles a flea-beetle .(q.v.), but is remarkable in being dimorphic, a portion of the females having well-developed wings, the remainder being short-winged. The best remedy is kerosene emulsion as an under spray, and the avoidance of planting susceptible crops after the cutting of clover fields. A related species is known as the false flea-hopper (*Agalliastes associatus*).

FLEA-LOUSE, one of the jumping plant-lice of the family *Psyllidæ*, familiarly represented by a pest of the pear-tree (q.v.). Some of the species make galls.

FLEABANE. See ERIGERON.

FLEAS, minute wingless insects with bodies covered by a strong armor of fine scaly plates and mouth-parts formed for sucking. They constitute the order *Siphonaptera* and are related to the *Diptera*. Everyone is familiar with these troublesome parasites of man and domestic animals, but few persons have studied them sufficiently to know the larval and pupal stages, or to recognize the fact that there are many species. Only recently has it been established that the flea most annoying to human beings in America is not the human flea of the Old World (*Pulex irritans*), but the so-called dog-and-cat flea (*Pulex serraticeps*). Both species are of cosmopolitan distribution, but the former is fortunately extremely rare in this country, while the latter is to be found everywhere. Observations conducted by the United States Department of Agriculture have shown that the development of these insects is hastened by a moist or humid atmosphere. The egg stage is very short, the larvæ, which are worm-like, spin cocoons in which the pupal stage is formed in from 7 to 14 days after hatching and the imago appears five days later, showing that in the warmest weather an entire generation may develop in little more than a fortnight. Fleas will develop successfully in any situation where they are not too much disturbed, as in rugs, mats or in straw or litter on which cats or dogs have slept; and they are also carried from one place to another by rats and mice and other animals. Dr. C. F. Baker ascertained in 1895 that there were 47 valid species of fleas in the United States; and probably this number might be doubled if all of the parasite of our larger animals were known. While many persons are indifferent to the presence of fleas others suffer severely from their attacks. Very many alleged cases of "hives" have been found to be produced by fleas, and epidemics of fleas in restricted areas as for example, in several neighboring houses, have been traced to the body of an animal which had died near by. The fleas desert the dying body of their host, jump on the clothing of any person passing and are thus carried from house to house. One means of protection against them consists in avoiding carpets, and keeping the floors painted and covered with rugs, which should be frequently moved, swept and aired. Household pets should be kept out of the house during the summer time; in fact, it is better to exclude cats entirely, because they cannot be washed and freed from parasites so readily as dogs. Rats and mice also carry these and other parasites. The best remedy for those who suffer from fleas is to apply ammonia as strong as can be borne and as soon as possible to the bite, which in some persons is followed by an eruption as big as a dime, attended by severe itching. The free use of baking soda would serve nearly the same purpose where ammonia cannot readily be obtained. Consult Howard & Marlatt, ‘Household Insects of the United States,’ issued by the Department of Agriculture; Anon., Teaching Fleas to Act (in *Illustrated World,* Vol. XXIV, p. 768, Feb. 1916); Anon., Huge Model of the Flea (in *Scientific American,* Vol. CX, p. 259, New York 1914); Bishopp, F. C., ‘Fleas’ (U. S. Agriculture Department, Bulletin No. 248, Washington 1915); Dall, W. H., ‘Educated Fleas’ (in *American Naturalist,* Vol. XI, p. 7, Boston 1877); Russel, H., ‘The Flea’ (London, n. d.).

FLÈCHE, La. See La Flèche.

FLECHIER, Valentin Esprit, French preacher and author: b. Perne Vaucluse, 10 June 1632; d. Montpellier, 16 Feb. 1710. He was brought up at Tarascon by an uncle who was superior of the Christian Brothers, which order he entered and soon acquired fame by the elegance of his style and his facility in Latin verse. In 1658 he left the teaching order and about 1660 repaired to Paris. Becoming tutor in the household at Caumartin, a Councillor of State, he accompanied the latter in 1665 to Clermont, where he wrote an account of the trip embellished with anecdotes of the people of the provinces through which he passed. Soon afterward he was appointed reader to the Dauphin and about this time established his reputation as a preacher, to which he added in the course of the next 20 years. In 1673 he was received member of the Academy, the same day as Racine. Becoming bishop of Lavaur in 1685 he was transferred to Nimes in 1687 and in this difficult seat exercised moderation in enforcing the ordinances in regard to the Protestants. As an orator he is inferior to Bossuet and Bourdalone, but as a writer he is charming. His principal efforts are ‘Orasion funèbre de Turenne’; ‘Mémoires sur les Grands jours tenus â Clermont en 1665.’ Consult Fabre, ‘Fléchier orateur’ (Paris 1885).

FLECHSIG, flex'ĭʜ, **Paul Emil,** German physician: b. Zwickau 1847. He received his education at the University of Leipzig and in 1884 became professor of psychiatry there. In 1882 he became director of the Clinical Institute of Psychiatry and Neurology at Leipzig. He made personal investigations of the European systems for the treatment of the insane, on which he is a recognized authority. He published ‘Die Irrenklinik der Universität Leipzig in den Jahren 1882–86’ (1887) and ‘Die Leitungsbahnen im Gehirn und Rückenmark des Menschen auf grund entwicklungsgeschichtlicher Untersuchungen dargestellt.’

FLECKHEISEN, flek'hī-zen, **Carl Friedrich Wilhelm Alfred,** German philologist and critic: b. Wolfenbüttel, 20 or 23 Sept. 1820; d. 7 Aug. 1899. He was educated at Helmstedt and at the University of Göttingen. He held several educational posts at Frankfort-on-the-Main and at Dresden, becoming in 1861 vice-principal of the Vitzthum'isches Gymnasium at Dresden. He is best known for his work on Plautus and Terence, in which Ritschl was his only equal. After 1855 he edited the department of classical philology of the *Jahrbücher für philologie und Pädagogik.* His works include ‘Exercitationes Plautinæ’ (1842); ‘Plauti Comœdiæ’ (Vols. I and II, 1850–51); ‘P. Terenti Afri Comœdiæ (latest ed., 1898)’; ‘Funfzig Artikel’ (1861). Consult Bursian, C., ‘Biographisches Jahrbuch für Altertumskunde’ (Vol. XXIII, 1901).

FLEECE, Golden, in Grecian mythology the fleece of gold taken from the ram on which Phrixus and Helle escaped from being sacrificed. See Argonauts; Golden Fleece, Capture of.

FLEECE, Order of the Golden, a military order instituted by Philip the Good, Duke of Burgundy, at Bruges, 10 Jan. 1429, on the occasion of his marriage with the Portuguese princess Isabella. The order now belongs to both Austria and Spain. See Golden Fleece, Order of.

FLEET, an appellation sometimes used in place of the more common word creek; an inlet or arm of the sea, as North-fleet, etc.; more specifically the name of a tidal stream, contributary to the Thames. In olden times it was partially navigable. It gradually degenerated into an open sewer and changed its name from Fleet River to Fleet Ditch. In modern times it has been covered up, but still forms part of London's sewerage system. The origin of its name is disputed, being by some ascribed to the swiftness of its current, and claimed by others to have been derived from the word float. Originally it was called the River of Wells. Its source is in Hampstead Heath. See Fleet Street.

FLEET MARRIAGES, irregular and clandestine marriages performed by imprisoned clergymen in Fleet prison, London, after 1696, when by Act of Parliament a penalty of £100 was imposed on any clergyman who celebrated a marriage otherwise than by banns or license. To the imprisoned clergymen in the Fleet prison such a law had no terrors for they had neither liberty, money nor credit. Marriages had been performed in the prison and vicinity from 1613 onward, but it was only after the passage of the act referred to that they became clandestine. The great expense of the public ceremony was the impelling motive of these clandestine marriages and many tavern-keepers near the prison kept a room fitted as a chapel for their performance. The scandals and abuses incident to such a system became so great that they became the object of special legislation in 1753, when an act was passed, which required, under pain of nullity, that banns should be published according to the rubric or a license obtained, and that, in either case, the marriage should be solemnized in church. This effectually put an end to clandestine marriages in England, and thereafter couples were obliged to travel to Gretna Green. The original records of such marriages, celebrated between 1686 and 1774, are called Fleet books or Fleet registers. They are now kept at Somerset House, London. Consult Ashton, J., 'The Fleet, its River, Prison and Marriages' (London 1888); Burn, J. S., 'The Fleet Registers, etc.' (London 1833).

FLEET PRISON, or **FLEET,** a historic prison in London, so called from its situation by the side of the Fleet (q.v.). In it were confined debtors, bankrupts and persons committed for contempt of the courts of chancery, exchequer and common pleas. It existed from the 12th century until its abolition in 1846. During its long existence it housed temporarily many prominent persons, amongst whom may be mentioned William Penn, who was there in 1707. A vivid description of its life, customs and abuses may be read in Dickens' 'Pickwick Papers.' Perhaps the most outstanding of the last were the so-called "Fleet Marriages" (q.v.).

FLEET STREET, London, one of London's historic highways. It derives its name from the Fleet River (q.v.). It extends from Ludgate Hill to Temple Bar at the east end of the Strand. As early as the 13th century it seems to have been known as Fleet Bridge street and in the early part of the 14th century it began to be mentioned frequently by its present name, spelled, of course, in accordance with the customs of those days. The west part of the street was destroyed by the great fire that devastated such a large part of London in the 17th century. For many years Fleet street was especially noted for its taverns and coffeehouses. Many notable persons of literary and political fame used to frequent these, and a few have survived to this day, in name at least. Three old London churches must also be mentioned as belonging to the Fleet street region: Temple Church, Saint Dunstan's and Saint Bride's. Fleet street witnessed throughout its long career many notable processions. Coronations, funerals, etc., never failed to pass through it. Famous men in large numbers had frequently close relations with Fleet street, either by living there or in one of its many side streets, or by being regular frequenters of its taverns. Amongst these should be mentioned especially Ben Jonson, Milton, Izaak Walton, Dryden, Dr. Johnson, Burke, Goldsmith and Lamb. In the 18th and 19th centuries Fleet street became the home of publishers of books, magazines and newspapers, after having housed quite a number of printers and booksellers in the two preceding centuries. Among these should be noted the famous publishing house of Murray, *Gentleman's Magazine, Punch, Daily Telegraph, Daily News, Standard, Daily Chronicle*, etc. Hardly a foreign or provincial newspaper, possessing London offices, is located elsewhere than in Fleet street and, though some of the big London dailies are located in some other part of London, Fleet street of to-day is still *the* journalistic street of London. In this connection should also be mentioned two volumes of poetry by John Davidson, bearing the title 'Fleet Street Eclogues' (London 1893 and 1896) and describing life from the point of view of a journalist. Consult Baker, H. B., 'Stories of the Streets of London' (London 1899); Bell, W. G., 'Fleet Street in Seven Centuries' (London 1912); Besant, Sir W., 'London in the 18th Century' (London 1902); Id., 'London in the Time of the Tudors' (London 1904); Id., 'Mediæval London' (London 1906); Id., 'London in the 19th Century' (London 1909); Id., 'London City' (London 1910); Id., 'London North of the Thames' (London 1911); Chancellor, E. B., 'The Annals of Fleet Street, etc.' (London 1912); Fitzgerald, P., 'Dr. Johnson and the Fleet Street Taverns' (in *Gentleman's Magazine*, U. S., Vol. XXVI, p. 305, London 1881); Hutchings, W. W., 'London Town Past and Present' (2 vols., London 1909); Hutton, L., 'Literary Landmarks of London' (New York 1897); Jesse, J. H., 'London and its Celebrities' (2 vols., London 1850); Lang, E. M., 'Literary London' (London 1906); Lemon, M., 'Up and Down the London Streets' (London 1867); Smith, J. T., 'An Antiquarian Ramble in the Streets of London' (2 vols., London 1846); Taylor, G. R. S., 'An Historical Guide to London' (London 1911); Welch, C., 'Modern History of the City of London' (London 1896); Wheatley, H. B., London, Past and Present' (3 vols., London 1891).

FLEETWOOD, Charles, English soldier: b. Northamptonshire, England; d. Stoke Newington London, 4 Oct. 1692. He was of good family, studied law, enlisted as a trooper in the Parliamentary forces, and commanded a regiment at the battle of Naseby (1645). He was elected member of Parliament in 1646, and appointed governor of the Isle of Wight in 1649. He took no part in the trial of the king. He was made lieutenant-general of cavalry in Cromwell's army, distinguished himself at the battle of Worcester (1651) and married Bridget, Henry Ireton's widow, the daughter of Cromwell. He was thoroughly in accord with Cromwell's policy, but opposed the movement to make Cromwell king. He became a member of Cromwell's House of Lords, and headed the army's opposition to the Parliament. He was put in command of the troops in Ireland, where he resided as Lord Deputy until 1655. He was appointed commander-in-chief of Richard Cromwell's army 18 Oct. 1659. At the Restoration, having taken no part in the death of Charles I, he was permitted to retire to obscurity.

FLEETWOOD, George, English regicide: b. in Buckinghamshire, England: d. about 1665. He represented his native shire in the Long Parliament (1647). He was one of the judges at the trial of King Charles, signed the death warrant of the king, raised a troop of horse for Cromwell's army and was by the latter raised to the peerage. By the government of Charles II he was condemned to death as a regicide, but by an act of the royal clemency the sentence was mitigated to confiscation of his estates, and he is believed to have emigrated to America.

FLEETWOOD, William, English clergyman: b. Tower of London, 1 Jan. 1656; d. Tottenham, 4 Aug. 1723. He was educated at

Eton and at King's College, Cambridge. Taking holy orders, he was appointed rector of Saint Austin's, London, and lecturer of Saint Dunstan's in the west about 1689. In 1702 he was made canon of Windsor and six years later Queen Anne, with whom he was a favorite, made him bishop of Saint Asaph. In 1714 he was translated to Ely. He was reputed the best preacher of his generation, but in 1712 his opposition to the doctrine of non-resistance embroiled him with Swift and the Tories. He wrote 'Essay on Miracles' (1701); 'Free Sermons' (1712), the preface of which displeased the Tory ministry. It was condemned to public burning but, being circulated in *The Spectator*, it secured the widest publicity. A collected edition of Fleetwood's works, together with a biographical notice, appeared in 1737.

FLEETWOOD, or BRANDY STATION, Battle of. General Hooker, suspecting that General Lee was gathering his forces on the upper Rappahannock for a movement northward and informed that General Stuart's Confederate cavalry was at Culpeper Court House, ordered General Pleasonton, who was at Catlett's Station, to cross the Rappahannock at Beverly and Kelly's Fords, attack Stuart and ascertain Lee's intentions. Pleasonton had the cavalry divisions of Buford and Gregg, and Hooker sent him two picked provisional infantry brigades of 3,000 men, under Generals Ames and Russell, making in all, cavalry and infantry, a force of 10,900 men. Stuart had five brigades of 10,200 men. At daybreak 9 June 1863 Buford, with his cavalry and one brigade of infantry, crossed at Beverly Ford and encountered one of Stuart's brigades, under command of Gen. Sam Jones, and a severe contest ensued, in which the 8th New York cavalry, Col. B. F. Davis, was routed and its commander killed. A charge of the 8th Illinois cavalry drove Jones back two miles, where he joined Stuart and the two brigades of Wade Hampton and W. H. F. Lee. Meantime Gregg, with his cavalry division and an infantry brigade crossed the river at Kelly's Ford and pushing back Robertson's brigade, approached Fleetwood Hill from the east, as Buford moved on Brandy Station from the northwest. Fleetwood Hill is a few hundred yards north of Brandy Station, and a hard hand-to-hand struggle ensued at both points, with varying success. Buford held his own near Brandy Station, but Gregg, at Fleetwood Hill, was finally compelled to withdraw, leaving three of his guns in the hands of the enemy. Pleasonton, satisfied that a great part of Lee's army was in his front, recrossed the Rappahannock with about 100 prisoners. The Union loss was 484 killed and wounded and 382 missing. The Confederate loss was 485, of whom 301 were killed or wounded. This engagement marks the beginning of the Gettysburg campaign. There were also various other actions and skirmishes in the same locality in August 1862 and in August, September, October and November 1863. Consult Johnson, R. U., and Buel, C. C., ed., 'Battles and Leaders of the Civil War' (Vol. III, New York 1884); Ropes, J. C., and Livermore, W. R., ed., 'The Story of the Civil War' (Part III, book 2, New York 1913); U. S. War Department, 'War of the Rebellion,' 'Official Records, etc.' (Series I, Vol. XXVII, Washington 1889–1902).

FLEETWOOD, or FLEETWOOD-ON-WYRE, England, seaport and military station in Lancashire, at the mouth of the Wyre, 230 miles northwest by north of London, on the London and Northwestern and the Lancashire and Yorkshire railways. It was laid out in 1836 by Sir Peter Fleetwood. It is important as a watering place, and its fisheries are in a prosperous condition. There are salt-works in the neighborhood. There is steamer communication with Belfast and Londonderry and the Isle of Man. The tramway lines, slaughter-houses, electric-lighting plant and other public utilities are the property of the municipality. It contains military barracks, a military hospital and a rifle range. Pop. 15,876.

FLEGEL, flā'gel, **Eduard Robert,** German traveler: b. Vilna, Russia, 1 Oct. 1855; d. Brass, mouth of the Niger, 11 Sept. 1886. He received a commercial education and in 1875 was employed by a company at Tagos, West Africa. Four years later he surveyed the Benue River, penetrating about 125 miles beyond the farthest point hitherto explored. The German African Society commissioned him to explore the entire Benue district and in 1880 he ascended the Niger to Gomba, and secured a permit from the sultan at Sokoto for an expedition to Adamawa. In 1882 he discovered the source of the Benue at Ngaundere. In 1883-84 he led another expedition up the Benue, visited Europe in the latter year and returned with a commission from the German African Company to open the Niger-Benue district to German trade. Flegel arrived to find that the district had been taken over by the English Niger Company. Although very ill he attempted the ascent of the Benue, but turned back at Yola and died soon after arriving at the coast. He wrote 'Lose Blätter aus dem Tagebuche meiner Haussafreunde' (Hamburg 1885); 'Vom Niger-Benue; Briefe aus Afrika' (Leipzig 1890).

FLEISCHER, flī'sher, **Charles,** American divine: b. Breslau, Germany, 23 Dec. 1871. Coming to America in 1880 he was graduated at the College of the City of New York in 1888 and from the University of Cincinnati in 1893, and rabbi from the Helven Union College of Cincinnati in the same year. In 1894 he succeeded Rabbi Solomon Shindler at Temple Israel, Boston, where he remained until 1911, founding in the latter year an independent religious institution, known as the «Sunday Commons» of Boston, of which he has since been leader. He is also known as a lecturer and contributor to magazines and newspapers. He wrote 'American Aspirations' (1914).

FLEISCHER, Heinrich Leberecht, German Orientalist: b. Schandau, Saxony, 21 Feb. 1801; d. Leipzig, 10 Feb. 1888. He studied at the University of Leipzig from 1819–24. In the latter year he went to Paris where he continued his studies of the Arabic, Turkish and Persian languages under de Sacy. From 1831-36 he taught at one of the Dresden high schools. In 1836 he accepted the chair of Oriental languages at the University of Leipzig, which he occupied until his death in spite of invitations to accept similar positions in Saint

Petersburg and Berlin. He was one of the few foreign members of the French Academy of Inscriptions, a member of many German and foreign scientific societies, possessor of honorary degrees from the universities of Königsberg, Prague, Saint Petersburg, Dorpat and Edinburgh, and one of the founders of the Deutsche Morgenländische Gesellschaft. He edited Abulfeda's 'Historia Ante-Islamica' (Leipzig 1831); Samachshari's 'Golden Necklaces' (Leipzig 1835); 'Ali's Hundred Sayings' (Leipzig 1837); Beidhawis, 'Commentary on the Koran' (2 vols., Leipzig 1846–48); catalogues of oriental manuscripts in the Royal Library at Dresden and in the Town Library at Leipzig. After Habicht's death he continued his edition of 'The Thousand and One Nights,' bringing out Vols. IX–XII (Leipzig 1842–1843). He also published a German edition of Mirza Mohammed Ibrahim's 'Grammar of the Modern Persian Language' (Leipzig 1847); 'Hermes Trismegistus an die Menschliche Seele' (Leipzig 1870); 'Kleinere Schriften' (3 vols., Leipzig 1885–88).

FLEISCHMANN, flīsh'män, **Wilhelm,** German agriculturist and chemist: b. Erlangen 1837. He received his education at Nuremberg, Würzburg, Erlangen and Munich. In Liebig's laboratory in 1862 he began work on agricultural chemistry and in 1864–67 while teaching in the Realschule at Memmingen conducted experiments there. From 1867–76 he was principal of the Realschule at Lindau and for the following 10 years directed the first dairy experiment station of Germany, in the vicinity of Lalendorf, Mecklenburg. From 1886 to 1896 he was director of the Agricultural Institute at Königsberg and of that at Göttingen after 1896. He did important work in the chemistry of milk. His works include 'Handbuch des Molkereiwesens' (1876); 'Altgermanische und altrömische Agrarverhaltnisse' (1906); 'Lehrbuch der Milkwirtschaft' (1908; English and Russian translations), and 'Cäsar, Tacitus, Karl der Grösse, und die deutsche Landwirtschaft' (1911).

FLÉMALLE, Le Maitre de, Flemish painter, whose proper name is thought to have been Jacques Daret: He flourished in the 15th century. At Tournai he studied art under Campin in 1427 and five years later became a member of the guild of painters there. Subsequently he labored at Lille, Bruges and Arras. In the latter city he painted a huge altarpiece, which is now divided in sections and held in different countries, 'The Nativity' in the Metropolitan Museum, New York; the 'Visitation' and 'Adoration of the Magi' in the Museum of Berlin, and 'The Presentation in the Temple' in Paris. In 1468 Flémalle is last mentioned in being present at the nuptials of Charles the Bold, at Bruges. His career is shrouded in considerable mystery; some authorities are of opinion that he is none other than Campin of Tournai, who left several important works, including 'The Descent from the Cross,' now in the Städel Institute, Frankfort; 'The Annunciation' at Brussels; 'The Adoration of the Shepherds,' at Dijon; 'Madonna and Child with Angels,' in the Metropolitan Museum, New York; and 'The Marriage of the Virgin,' in the Prado, Madrid. Consult Houtart, 'Jacques Daret' (Tournai, no date); Hulin de Loo in *Burlington Magazine* (1909; 1911); and Winckler 'Der Meister von Flémalle und Rogier von der Weyden' (Strassburg 1913).

FLEMING, George. See FLETCHER, JULIA CONSTANCE.

FLEMING, John, Scottish naturalist and clergyman: b. near Bathgate, Linlithgowshire, 1785; d. 1857. After securing his license as a preacher he settled in Fifeshire, where he gave most of his attention to the study of natural science. He soon gained the reputation of the first zoologist of Scotland and in 1834 became professor of physics at the University of Aberdeen. He was afterward summoned to the chair of natural history at Edinburgh. He originated the dichotomous or binary system of classification, which he sought to establish despite the opposition of Cuvier and the adherents of the latter. His works include 'Economic Mineralogy of the Zetland and Orkney Islands' (1807); 'Philosophy of Zoölogy' (1822); 'History of British Animals' (1828).

FLEMING, John, American clergyman and missionary: b. Mifflin County, Pa., 12 April 1806; d. Ayr, Neb., October 1894. He was educated at Jefferson College and New Jersey College, was graduated from the latter in 1829, and from Princeton Theological Seminary, in 1832. He was ordained to the ministry of the Presbyterian Church, by a synod at Lewistown, Pa., in October 1832, shortly after which he left for the Creek Nation, in the Indian Territory, where he had been assigned to work by the American Board of Commissioners for Foreign Missions. Being one of the first missionaries to go among the Creek people, he devoted himself to the study of the Creek, or Muskogee language, for which he devised an alphabet which enabled him to reduce it to writing. He prepared and published several primary textbooks in the Creek language and also translated and published hymns. His work encountered much opposition from some of the less progressive members of the tribe and finally, as the result of baseless charges, he was ordered to leave the tribal reservation, which he did in 1836. In 1838 he was assigned a mission at Green Bay, Wis., but the station was soon discontinued. He then settled in a pastorate in Westmoreland County, Pa., where he remained until 1851, when he removed to La Salle County, Ill., and engaged in home mission work. In 1876 he settled at Ayr, Neb., where he made his home until his death. Though his service as a missionary among the Creek Indians was comparatively brief, his work in reducing their language to writing formed the basis of the more successful efforts of those who followed in later years.

FLEMING, John Ambrose, English electrical engineer: b. Lancaster, England, 1849. He was educated at the Royal College of Chemistry and Saint John's College, Cambridge, has been professor of electrical engineering in the University of London since 1910, and for the past 25 years associated with the development of electrical science. He has published 'Treatise on the Alternate Current Trans-former’ (1889–92); ‘Electric Lamps and Electric Lighting’ (1894); ‘Magnets and Electric Currents’ (1897); ‘Waves and Ripples in Water, Air and Ether (1902); ‘The Principles of Electric Wave Telegraphy and Telephony’ (1906); ‘The Wonders of Wireless Telegraphy’ (1913), etc.

FLEMING, or FLEMMING, Paul, German lyric poet: b. Hartenstein, Saxony, 5 Oct. 1609; d. Hamburg, 2 April 1640. He studied at the University of Leipzig, and later at that of Leyden where he received his M.D. degree. In the meantime, having joined as an attaché an embassy to Russia and Persia, he had an opportunity (1635–39) of studying many peoples. His ‘Deutsche Pœmata’ appeared in 1642 in Lübeck. They have been reprinted repeatedly. The best modern edition is that by J. M. Lappenberg (2 vols., Stuttgart 1863). The same editor also brought out his ‘Latin Poems’ (Stuttgart 1866). There are likewise a number of editions, containing selections of his works (Stuttgart 1820; Leipzig 1822; Leipzig 1870; Stuttgart 1885). A German translation of some of his Latin poems was published by Kirchner (Halle 1901). Fleming was an admirer of and considerably influenced by Martin Opitz (q.v.). Many of his lyric poems show considerable depth of feeling and great sincerity. In some of his religious poetry he achieves expressions of the truest piety and especially one of them has become a well-known and much-sung hymn ‘In allen meinen Taten, lass ich den Höchsten raten.’ Consult Boremann, A., ‘Paul Fleming’ (Stettin 1899); Naumann, G., ‘Paul Fleming’ (Güstrow 1874); Olearius, A., ‘The Voyages and Travels, etc., to Muscovy and Persia, etc.’ (trans. by J. Davies, 2 vols., London 1662); Schmitz, F. W., ‘Metrische Untersuchungen zu Paul Flemings Deutschen Gedichten’ (in *Quellen und Forschungen zur Sprach und Kultur-Geschichte der Germanischen Völker,* Vol. CXI, Strassburg 1910); Straumen, J., ‘Paul Flemings Leben und Orientreise’ (Leipzig 1892); Tropsch, S., ‘Flemings Verhältnis zur Römischen Dichtung’ (in *Grazer Studien zur Deutschen Philologie,* Part III, Graz 1895); Unger, K., ‘Studien über Paul Flemings Lyrik’ (Griefswald 1907); Wenderoth, G., ‘Paul Fleming als Petrarkist’ (in *Archiv für das studium der Neueren Sprachen und Litteraturen,* Vol. CXXIV, n. s. Vol. XXIV, p. 109, Braunschweig 1910).

FLEMING, Richard, also spelled, **FLEMMING, FLEMYNG,** and **FLEMMYNG,** English prelate: b. Yorkshire, about 1360; d. Sleaford, 25 Jan. 1430 or 1431. At first a supporter of Wycliffe’s doctrines he subsequently, when bishop of Lincoln, became staunchly orthodox and is remembered as the prelate who, at the command of Pope Martin V, dug up and burned the body of Wycliffe and cast the ashes into the Swift (1427). He was educated at University College, Oxford, and took orders. From 1406–19 he held various prebends. In the latter year he was made bishop of Lincoln. In 1423 he acted as president of the English delegation to the general councils of Pavia and Siena. Upon his return to England he was appointed by the Pope to the archbishopric of York, but could not obtain the royal consent and was forced to remain in Lincoln as bishop. For a number of years previous to his death he planned a college at Oxford to be a bulwark against heresy. Although a royal charter was granted to him for that purpose and he drew up part of the statutes of the new college, the institution, which was named Lincoln College, was not founded until after the bishop’s death. He was buried in Lincoln Cathedral where his altar tomb and effigy may still be seen. Consult ‘Statutes of Lincoln College’ (Oxford 1853); Thompson, A. H., ed., ‘Visitations of Religious Houses in the Diocese of Lincoln’ (in *Canterbury and York Series,* Vol. XVII, London 1915); Wood, A., ‘The History and Antiquities of the Colleges and Halls in the University of Oxford’ (Oxford 1786–90).

FLEMING, Sir Sandford, Canadian engineer: b. Kirkcaldy, Fifeshire, Scotland, 7 Jan. 1827; d. Halifax, Nova Scotia, 22 July 1915. He went to Canada in 1845, was for a time on the staff of the Northern Railway, and was engineer-in-chief in the construction of the Canadian Pacific railways. He was the author of ‘The Inter-Colonial: a History, 1832–76’; ‘England and Canada’; ‘Time and its Notation’; etc. He was knighted in 1897.

FLEMING, William Hansell, American Shakespearian scholar: b. Philadelphia, Pa., 23 Aug. 1844; d. New York, 1 Oct. 1915. He was educated at Princeton University and publish ‘How to Study Shakespeare’ (1897–99), and edited the ‘Bankside Shakespeare.’ He wrote ‘A Bibliography of Shakespeare First Folios in New York City,’ also many papers on Shakespearean subjects in *Werner’s Magazine,* the *Looker-On,* and other journals.

FLEMING, Williamina Patton Stevens, American astronomer: b. Dundee, Scotland, 1857; d. 1911. From 1871 to 1876 she taught school at Dundee, coming to the United States she was appointed assistant at the Harvard College Observatory in 1879. In 1898 she became curator of astronomical photographs there and subsequently was placed in charge of the Astrophotographic Building. In 1897 and again in 1902 she found the spectrum of meteors on exposed plates. She discovered several new stars. She was honorary member of the Royal Astronomical Society of London after 1906. Her published works are ‘A Photographic Study of Variable Stars’ (1907) and ‘Spectre and Photographic Magnitudes of Stars in Standard Regions’ (1911).

FLEMINGS. See GERMANY — POLITICAL HISTORY.

FLEMINGSBURG, Ky., town and county-seat in Fleming County, on the Cincinnati, Flemingsburg and Southeastern Railroad, 64 miles southeast of Cincinnati. It is in an agricultural region, has a trade in tobacco, poultry and live stock, and manufactures tobacco, flour, lumber, etc. Pop. 1,219.

FLEMINGTON, N. J., town and county-seat of Hunterdon County, on the Pennsylvania, the Lehigh Valley and the Central Railroad of New Jersey, 50 miles west of New York. It is the commercial centre for a productive agricultural region and has manufactures of foundry and machine-shop products, shutters, vinegar, gloves, stoneware, flour, brick and cut glass. There is a public library. As early as 1712 nearly all the land comprising the site of the present borough was owned by the three proprietors, William Penn, Daniel Coxe and Joseph Kirkbridge. During the Revolution, Flemington was in some degree a centre for military operations, and in 1776 a skirmish took place here in which the British troops were routed.

FLEMISH ART. See FLEMISH SCHOOL.

FLEMISH BOND, in bricklaying, a method of positioning or bonding bricks in a wall, so as to tie and break joints. It consists of a header and stretcher alternately, the headers binding two courses.

FLEMISH LANGUAGE AND LITERATURE. *Vlämisch* or *Duytsch,* the Low German vernacular spoken by the Vlamingen or Flemings inhabiting the Belgian provinces of East and West Flanders, parts of Holland and the French department of Nord, is akin to the Frisian and to the Hollandish or Dutch which is its younger branch. The latter differs from Flemish in having been reformed and simplified, while Flemish retains the greater part of the archaic features of its 16th century spelling, pronunciation, and words and forms of speech of French and Spanish origin. Since Belgium became an independent kingdom in 1830, a strong desire has been manifested to foster Flemish traditions and to cultivate and promote its language and literature; before that date its history is identified with that of Dutch language and literature. (See HOLLAND). Among early Flemish literature is the ‹Spiegel historical› (historic mirror) of Jacob van Maerlant (1235–1300), a translation of ‹Boece› or ‹Boethius› by Jacob Velt of Bruges in the 15th century, and the ‹Hive of the Catholic Church,› by Philip van Marnix (1569). The modern movement to rehabilitate the vernacular was largely due to the efforts of Jan Frans Willems who before the separation of Belgium from Holland had strenuously advocated its use as a literary language. With the able co-operation of such authors as Van Ryswyck, Ledeganck, Rense, Van Duyse, Blieck, Serrure, David Conscience and others, the movement made great progress, received official support, and was crowned with success in 1886 when the Koninklije Vlaamsche Akademie (Royal Flemish Academy) was founded and the use of Flemish, as well as French, was adopted as the legal and official language of the kingdom. Prominent amid modern Flemish literature is the verse of Ledeganck: ‹De drie Zustersteden,› ‹De Hut in 't Wowd,› etc.; of Ryswyck, ‹Antigonus,› ‹Eppenstein,› and ‹Oorspronkelikje Verhalen›; of Van Beers, ‹Begga,› ‹Levensbeelden,› ‹Gevoel en Leven›; and ‹Gedichten, Gezangen en Gebeden› of Guido Gezelle. Among works of fiction are Hendrick Conscience's ‹Artevelde›; Delcroix's, ‹Geld of Liefde› and ‹Philippine van Vlaanderen›; Sleeckx's, ‹In't Schipperskwatier› and ‹Dirk Meyer›; and Sneiders' ‹De gasthuisnon.› Other well-known novelists are Bergmann, Madame Courtmans, and the two poetesses, Rosalie and Virginie Loveling, poets also including Dantzenberg, De Cort, and Van Droogerbroeck. Representative drama is Sleeckx's ‹Mester en Knecht,› and ‹Zannekin.› Among the newest names in the various literary genres are Hilda Ram, Pol de Mont, Geyter, Cyril Buysse, Streuvels, Saabe, Woestÿne, Baekelmans, De Clercq, Rooses and De Potter. Consult Willems, ‹Sur la langue et la littérature neerlandaises, par rapport aux provinces méridionales des Pays-Bas› (1818); Vercoullie, ‹Spraakleer van net Westvlaamsch› (1894); Hamelius, ‹Histoire politique et littéraire du mouvement flamand› (1894); the ‹Vlaamsche Bibliographie› of the Flemish Academy of Ghent, for publication between 1830 and 1890; Kurth, ‹La frontière linguistique en Belgique› (2 vols., Bruxelles 1895–98); Coopman, ‹Geschiedenis der vlaamsche letterkunde› (Antwerp 1910).

FLEMISH SCHOOL, a school of painting which originated in Flanders in the early part of the 15th century, with the invention, or at least the first practice, of painting in oil. It has been generally attributed to Jan Van Eyck, who was accustomed to varnish his distemper pictures with a composition of oils. In course of practice he came to mix his colors with oil instead of water, which rendered them brilliant without the trouble of varnishing From this and subsequent experiments arose the art of painting in oil. The chief early masters of the school were Jan Van Eyck and his brother and sister, Hubert and Margarete, Matsys, Mabuse, Memling, Weyden and Moro; to the second period belong Rubens, VanDyck, Snyders, Jordaens and the younger Teniers.

FLEMMING, Walter, German anatomist: b. Sachsenberg, 21 April 1843; d. 1905. He received his education at Göttingen, Tübingen, Berlin and Rostock. In 1871 he became privatdocent at the University of Rostock, removing to Prague in 1872, and to Kiel in 1876 as professor of anatomy. He made valuable contributions to our knowledge of cell structure and of mitosis. His works include ‹Zellsubstanz, Kern und Zelltheilung› (1882); ‹Beiträge zur Kenntniss der Zellen und ihrer Lebenserscheinungen› (1881); ‹Studien über Regeneration der Gewebe› (1885); ‹Neue Beiträge› (1891).

FLENSBURG, flāns'boorg, Prussia, town in the province of Schleswig-Holstein, on the Baltic, 40 miles northwest of Kiel. It was a place of importance as early as the 12th century, but subsequently suffered much from wars and conflagrations. It is again prosperous, and is now the most important town in Schleswig. The industrial establishments include shipbuilding yards, sugar-refineries, tobacco-factories, soapworks, machinery, paper, cement, breweries, distilleries, etc. In 1866 it fell to Prussia as part of the duchy of Schleswig-Holstein. Pop. 60,922.

FLERS, flėr, France, town in the Department of Orne, on the Vère, 40 miles south of Caen. It contains an old château, a Romanesque church, communal college, and manufactures of cotton and linen fabrics, drugs and chemicals, bricks and tiles, flour, dyes, etc. Pop. 13,610.

FLESCH, Karl, Hungarian violinist: b. Moson 1873. He studied at the Vienna Conservatory under Grün in 1886–89 and at the Paris Conservatory under Marsick in 1890–94. In 1895 he made his début in Vienna and from 1897 to 1902 was professor at the Bucharest conservatory and leader of the private quartet of the Queen of Rumania. From 1903 to 1908 he was professor at the Conservatory of Amsterdam. In 1909 he gave five historical violin recitals in Berlin, which had a phenomenal success. In that year he settled in Berlin as a private teacher and virtuoso, meeting with signal success in both ventures. In 1910 he published 'Urstudien' for violin, which proved him to be among the foremost teachers of violin. He made a concert tour of the United States in 1913–14 which was very successful. He published editions of the violin works of Mozart, Mendelssohn, Beethoven, Kreutzer and Paganini.

FLESH. The softer tissues of the animal body, as the muscle and fat, but excluding the fluids, bones, skin and hair. Viewed as food, it is composed of the proteids, myosin, musclin, myoglobulin and myo-albumin, together with varying amounts of fats, salts and nitrogenous extractive substances, and about 75 per cent of water. Of the three classes of foodstuffs common to the human economy, meat supplies most of the proteid and fat, while the vegetable kingdom supplies the carbohydrates. The proteids are more properly the tissue-building elements, while the fats and carbohydrates are more readily oxidized, and supply the body with energy. Proteids must be taken as such, since the human economy cannot cause conversion of the other sorts of food into proteids. The minimum of these various substances for the proper preservation of life has not been positively determined, but approximately the average healthy man requires 100 grams of fat, 400 grams of carbohydrate, and 100 grams of proteid per diem. The necessary amount of proteid material can be obtained from the vegetable kingdom, and there is no doubt that some systems are better suited for this diet; but the popular opinion is that a mixed diet, containing a certain amount of meat, is more readily taken care of. The meat proteids are usually more quickly and completely digested. Vegetarians do not agree with this view, contending that the use of animal flesh for food is not requsite to health, and involves cruelty and brutality toward helpless creatures. The nitrogenous extractive substances, ceratine, the xanthin bases, and the like, are also of value to the system because of their power of exciting gastric secretions and stimulating circulation. The various meat extracts contain a large proportion of these substances, and most of them have little else. An overabundance of meat very frequently causes a nervous, irritable condition. This is less true of the so-called white meats, a difference not to be explained on the ground that the white meats contain less of the extractives, since the opposite is the case. As a general rule the diet of the well-to-do in America is entirely too high in the amount of albuminous foods. These constant errors find their expression in the well-nigh universal complaint of dyspepsia and so-called uric-acid disturbances. Such intoxications are almost sure to follow if more animal food is taken than can be digested and absorbed. Putrefaction of the unabsorbed food takes place, with generation of toxic substances and absorption of them into the general circulation. (See FOOD). Consult Blyth, 'Foods' (1909); Cocroft, 'Foods, Nutrition and Digestion' (1912).

FLESH BIRD, in North America, a name often applied to the Canada jay, from its habit of approaching camps and dwellings in search of meat fragments which it devours avidly. The name is given to other birds of similar habits in other parts of the world.

FLESH-FLY, any of a large group of showy flies (family *Sarcophagidæ*), the more familiar and typical members of which breed in decaying flesh. Some, however, pass their larval stages in dung, or decaying vegetables, or are parasitic in the wounds and sores of animals and man. Most of them look like large house-flies, sometimes bright with metallic blue or green, or gray with black stripes; common names are "blue-bottle" (for *Lucilia cæsar,* which often comes into houses in stormy weather), or "green-bottle," for the "blow-flies" (q.v.) of the genus *Calliphora*. The common flesh-fly of Europe (*Sarcophaga carnaria*) is a pest that does not appear in the United States, but we have a very similar and equally troublesome species in *S. sarraceniæ*. The directness with which these flies find and utilize a piece of decayed meat, for the deposit of their eggs, or their living maggots, avoiding fresh meat equally accessible, is regarded as an evidence that they are under the control of a primal impulse rather than merely following a sense of smell. These flies breed by laying their eggs in clusters of from 3 or 4 to 100 or more on dead animal meat, avoiding the fat as a place of deposit. The larvæ develop in about 24 hours, immediately burrowing into the meat where they find sustenance for a fortnight, while developing to pupæ. They are thus active in the process of removal of carrion and dead bodies. Flesh-flies are almost as ready to locate in open flesh-wounds, as in dead meat, and are a serious menace to the uncared-for wounded on the battle field. See FLIES.

FLESHLY SCHOOL, The. See DECADENTS.

FLETA, an ancient English law treatise, with the subtitle "seu Commentarius juris Anglicani." From internal evidence it appears to have been written about 1290 in the reign of Edward I and is so-called because of the belief that it was written in the Fleet prison. It is a poor imitation of Bracton, was first printed by J. Selden (1647; 2d ed., 1685). Consult Sheldon, J., 'Dissertation on Fleta' (Kelham ed., London 1771).

FLETCHER, Alice Cunningham, American ethnologist: b. Boston, Mass., 1845. She was instrumental in securing land in severalty to the Omaha tribe by Act of 7 Aug. 1882; appointed special agent to allot Omaha tribe 1883–84; appointed special agent by the President under the Severalty Act of February 1887; allotted the Winnebago tribe 1887–89; Nez Perces tribe 1889–92. She was originator of the scheme by which loans are made to Indians to build houses on their lands; was connected with the Anthropological Department of the Chicago Exposition 1893 and served on the International Jury, also on International Jury of the Saint Louis Exposition 1904; assistant in Ethnology, Peabody Museum 1882; holder of the Thaw Fellowship, Peabody Museum, Harvard University 1891; ex-president of the Anthroroloqical Society of Washington, D. C.; ex-president of the American Folk Lore Society; Fellow of A. A. A. S., vice-president in 1896; officer of the Archæological Institute of America. She is author of numerous papers on anthropology; 'Study of Omaha Music' (1893); 'The Ha-ko'; 'The Omaha Tribe,' published by the United States Bureau American Ethnology; 'Indian Story and Song from North America' (Boston 1900); 'Indian Games and Dances with Native Songs' (Boston 1915).

FLETCHER, Andrew, of Saltoun, Scottish political writer and patriot: b. Saltoun, Haddingtonshire, 1655; d. London, September 1716. His tutor was Gilbert Burnet, afterward bishop of Salisbury, then minister of Saltoun. In 1681 he entered upon his public career. Having been prominent in opposition to the oppressive measures of Lauderdale and the Duke of York, he deemed it prudent to retire to Holland; and on his non-appearance to a summons from the lords in council he was outlawed. In 1683 he took part in the Rye House conspiracy. In 1685 he joined the enterprise of the Duke of Monmouth, but in a quarrel about a horse, he shot dead the mayor of Lyme, fled to Spain, then made his way to Hungary and fought against the Turks. He subsequently joined the Scottish refugees in Holland, and when the revolution of 1688 took place returned to England with William of Orange, resumed possession of his estate and became a member of the convention for settling the new government in Scotland. He became interested in the ill-fated Darien Scheme. A republican in principle, and a patriot at once courageous and disinterested, he was the leader of the opposition to the union of the Parliaments of England and Scotland in 1707, favoring instead a federal union. He it was who introduced winnowing fanners and the pot-barley mill in Scotland. He will always be remembered for his saying «that if he were permitted to make a country's ballads, he would not care who made the laws.» In 1698 he printed 'A Discourse on Government in Relation to Militias'; and also, 'Two Discourses Concerning the Affairs of Scotland.' His tracts and some of his speeches appeared in one volume, entitled 'The Political Works of Andrew Fletcher, Esq.' (1737). Consult Omond, 'Fletcher of Saltoun' (1897).

FLETCHER, Banister Flight, English architect: b. 15 Feb. 1866. He was educated at University College, London, and at the Royal Academy. He won a number of professional prizes and studentships, including the Architectural Association Medal for Design in 1888. He was formerly lecturer and assistant professor at King's College, London, and examiner to the City and Guilds of London Institute; university extension lecturer on architecture at London University. He also studied law and became barrister-at-law of the Inner Temple and partner in the firm of Banister Fletcher and Sons, architects for a number of country houses, schools, churches, banks, institutes and city buildings. He has traveled extensively on sketching expeditions in Belgium, Holland, central and northern France, Germany, Italy, Sicily, Greece, Asia Minor, Constantinople, Crete, Egypt, North Africa, Palestine, Spain, the United States and Canada. He has published 'A History of Architecture on the Comparative Method' (5th ed.); 'Andrea Palladio: His Life and Work'; 'Architecture and the Humanities'; 'The Influence of Material on Architecture'; 'The English Home'; 'Architectural Hygiene,' and other textbooks.

FLETCHER, Benjamin, English colonial governor of New York. He was appointed by William and Mary in 1692, after serving during the war in the Low Countries, as well as in Ireland. When William Penn was for a time deprived of his proprietary rights Fletcher served as governor in Pennsylvania (1693-94). He was in 1698 forced to resign from his post in New York, and many charges were made against him. Consult Wilson, 'Memorial History of the City of New York' (1892).

FLETCHER, Duncan Upshaw, American legislator: b. Sumter County, Ga., 6 Jan. 1859. He was graduated at Vanderbilt University in 1880, was admitted to the bar in the following year and established his practice at Jacksonville, Fla. In 1893 he became a member of the Florida House of Representatives, served as mayor of Jacksonville in 1893-95, and 1901-03; was chairman of the Democratic State Committee in 1905-08, and United States senator from 1909 to 1915. He was re-elected for the term 1915-21. He is a trustee of John B. Stetson University, Deland, Fla.

FLETCHER, Frank Friday, American naval officer: b. Oskaloosa, Iowa, 1855. In 1875 he was graduated at the United States Naval Academy, became captain in 1908 and rear-admiral in 1911. He was aide to the Secretary of the Navy in 1910, and in the following year commanded the fourth division of the Atlantic fleet, and later the third division. He commanded the naval forces which took Vera Cruz on 21 April 1914 and in June of the same year succeeded Rear-Admiral Badger as commander-in-chief of the North Atlantic fleet. He invented the breech mechanism and gun mounts known by his name.

FLETCHER, Giles, English poet: b. Watford, Hertfordshire, about 1549; d. London, March 1611. He was Ambassador to Russia in 1588, but his description of that country, 'Of the Russe Common Wealth,' appearing in 1591, was suppressed. It was reprinted for the Hakluyt Society 1856. He also wrote 'Licia: Poems of Love' (1593).

FLETCHER, Giles, English poet: b. about 1588; d. 1623. He was a son of Giles Fletcher the elder, and wrote the poem, 'Christ's Victory' (1610). A new edition appeared in 1824.

FLETCHER, Horace, American sociologist and nutrition expert: b. Lawrence, Mass., 10 Aug. 1849. He received his education at Dartmouth College, traveled extensively and after 1895 made special researches in sociology and human nutrition. He advocated certain theories concerning the mastication of food and thus gave rise to the well-known cult known as Fletcherism. He was consulting editor of the *Christian Endeavor World*, the *Ladies' Home Journal* and *Good Health Magazine*. In England he was chosen vice-president of the Food Reform Society and also served as president of the American Health and Efficiency League. He is a Fellow of the American Association for the Advancement of Science. He has written 'ABC of Snap Shooting'; 'Menticulture'; 'Happiness'; 'That Lost Waif, or Social Quarantine'; 'What Sense? or Economic Nutrition›; ‹Nature's Food Filter, or What and When to Swallow›; ‹Glutton or Epicure›; ‹Fletcherism, What It Is.› In recent years he has been occupied as food economist of the Commission for Relief in Belgium and in travel and research work connected with nutrition and child-conservation.

FLETCHER, John. See BEAUMONT, FRANCIS, AND FLETCHER, JOHN.

FLETCHER, John, or FLECHERE, de la, English clergyman: b. Nyon, Switzerland, of Swiss parentage, 12 Sept. 1729; d. Madeley, England, 14 Aug. 1785. He was educated at Nyon and at the Academy of Geneva, now Geneva University, where he spent seven years. Later he studied at Lenzburg. He offered his services to Portugal when it was fighting Brazil and raised a company of his countrymen and received a captain's commission in the Portuguese army. An accident prevented his going on shipboard with his company. The ship was never heard of again. When he recovered he returned to Switzerland. In 1749 or 1750 he visited London. The first 18 months he spent in the home of a school teacher named Mr. Burchall. In 1752 he became tutor to the two sons of Mr. Thomas Hill of Tern Hall in Shropshire. While on a journey to London he first met Methodists and soon after joined them, about the year 1756. In 1757 he was ordained deacon and priest by the bishop of Hereford. He received the appointment of curate of Madeley which was only a nominal position. In 1760 he became vicar of Madeley and lived there the rest of his days excepting three years spent in Switzerland. He was a close friend of the Wesleys and often assisted them. He was designated by John Wesley as his successor. He was the chief writer of Methodism excepting John Wesley. His most important work was ‹Checks to Antinomianism›; which has passed through many editions.

FLETCHER, John Gould, American writer: b. Little Rock, Ark., 3 Jan. 1886. He studied at Harvard, and spent several years in Europe, visiting Italy, France and England. He is best known as one of the exponents of the Imagist school of poets. His poems are in vers libre, polyphonic and are of indifferent merit. They include ‹Irradiations — Sand and Spray› (1915); ‹Goblins and Pagodas› (1916); ‹Japanese Prints› (Boston 1918). For a partisan appreciation consult Lowell, Amy, ‹Tendencies in Modern American Poetry› (New York 1917).

FLETCHER, Julia Constance, novelist and dramatist: b. Brazil, 1858. Her father was a missionary and she received her education in the United States and Europe. She took up her residence in Italy and under the pseudonym "George Fleming" published the novels ‹A Nile Novel› (1877); ‹Mirage› (1878); ‹Head of Medusa› (1880); ‹Vestiga› (1884); ‹Andromeda› (1885); and the plays ‹Mrs. Lessingham› (1894); ‹A Man and His Wife› (1897); ‹The Canary› (1899); ‹The Fantasticks› (1900); ‹The Light that Failed› based on Kipling's Story (1903); and ‹The Conquest› from the French (1909). She collaborated with Mrs. Frances Hodgon Burnett in ‹The First Gentleman in Europe› (1897); and is the author of ‹For Plain Women Only: Dissertations on Feminine Interests› (1896).

FLETCHER, Lazarus, English mineralogist: b. Salford, England, 3 March 1854. He was educated at Balliol College, Oxford, was appointed keeper of minerals in the British Museum in 1880 and director of the natural history department in the same institution in 1909. He has published ‹Introduction to the Study of Meteorites› (1881); ‹Introduction to the Study of Minerals› (1884); ‹The Optical Indicatrix› (1892); ‹Introduction to the Study of Rocks› (1895).

FLETCHER, Phineas, English poet: b. Cranbrook, Kent, April 1582; d. 1650. He was a son of Giles Fletcher the elder and a cousin of John Fletcher (q.v.). He was the author of ‹Siceides,› a pastoral drama (1614); ‹The Purple Island and Piscatory Eclogues› (1633). ‹The Purple Island› is an allegorical description of man, the body being the island, the bones its foundation, and the veins the streams, and founded upon an allegory in the ninth canto of the second book of the ‹Faerie Queene.› It is composed in the Spenserian manner, and is not without passages of strong fancy and beauty of description. In the first five cantos, however, the poet is buried under in the anatomist — a character but little adapted to the handling of poetry. When, however, he steps from the physical to the intellectual man, he not only attracts, but secures attention by a profusion of images, many of which are distinguished by much boldness of conception and brilliancy of coloring. The ‹Piscatory Eclogues› have considerable sweetness of versification, and much descriptive elegance. Milton was indebted to both Phineas and his brother Giles for inspiring different passages of the ‹Paradise Lost› and ‹Paradise Regained.› Consult Grosart, A. B., ‹Fuller Worthies Library› (1868); and F. S. Boas' edition in the ‹Cambridge English Classics› (1908–09).

FLETCHER, William Isaac, American librarian: b. Burlington, Vt., 28 April 1844. From 1883 to 1911 he was librarian of Amherst College, where he also taught library economy in the summer school for 14 years (1891–1905). In 1891–92 he served as president of the American Library Association. He was coeditor of *Poole's Index to Periodical Literature* (1882–1911); and is the author of ‹Public Libraries in America› (1895); the ‹A. L. A. Index to General Literature› (1893); and the ‹Co-operative Index to Periodicals› (1883–1911).

FLETCHERISM. This is a term invented to apply to the mastication of food to the point of complete pulpifaction as taught by Mr. Horace Fletcher (q.v.). He ascertained the fact that the average human being did not masticate his food as thoroughly as he should, and set about ascertaining what would happen if every mouthful were masticated until it had been completely dissolved and reduced to a creamy pulp. It was soon found that some foods required several hundred motions of the jaw to be sufficiently reduced; others lost their taste and became noxious when submitted to this prolonged mouth-treatment; in other cases, solid portions of the food — husks, etc.,— came to the front of the mouth of their own accord; and could be swallowed only with difficulty. If mastication be followed to the point required, it will be found, Mr. Fletcher concludes, that no voluntary movements of swallowing are required; it «swallows itself,» as it were by physiological action.

This, it is claimed, throws less work on the stomach and intestines, by reason of the fact that the food is more completely broken up before being swallowed. Further, certain chemical changes take place in the mouth, which do not take place when mastication is less perfect. The body is thus nourished more fully on a less amount of food, and in consequence of this lessened intake of food, the body is cleansed, and rids itself from a host of ills to which it has been heir. Consult Fletcher's works, 'The New Glutton or Epicure,' and 'The ABC of Our Nutrition.'

FLETT, John Smith, British geologist: b. Kirkwall, Orkney, 1869. He was educated at Kirkwall Burgh School, George Watson's College and the University of Edinburgh. He became assistant to Prof. James Geikie and lecturer in petrology in Edinburgh University. He joined the British Geological Survey in 1900 becoming assistant to the director in charge of the survey of Scotland in 1911. He was sent by the Royal Society to the West Indies along with Dr. Tempest Anderson to report on the volcanic eruptions at the Soufrière in 1901. He published 'Report on West Indian Eruptions' (Royal Society 1902); and is joint author of many memoirs of the geological surveys of Land's End, Lizard, Bodmin and Saint Austell, Edinburgh, Ben Wyvis.

FLEUR-DE-LIS, flėr-de-lē, an heraldic emblem probably derived from the iris-plant. As a decorative device it was common in ancient times in India and Egypt and is also found frequently on Etruscan bronzes. Some of the great families of France (most of whom are now extinct) bore the emblem on their shields from the very commencement of the practice of blazoning, and a large number of families in Germany, Sweden, Switzerland, and other parts of Europe have borne the fleurs-de-lis on their coats of arms from the 12th century. The great popularity of this emblem in France dates from the 13th century. The royal coat of arms of France consisted of three golden lilies on a blue ground, with the device, «*Lilia neque nent neque laborant.*» The shield of France was anciently, in heraldic language, *sémé de fleurs-de-lis,* that is, bore this emblem scattered over the shield. It is commonly believed that it was Charles V (1364–80) who reduced the number to three; but this is disproved by the fact that two seals have been preserved, the one belonging to Philip the Fair (1285–1314), the other belonging to Philip of Valois (1328–50), both of which bear three fleurs-de-lis; and the town library of Rouen contains a collection of charts relating to the celebrated abbey of Savigny, to one of which, bearing the date 1212, a seal is attached, which is still in a state of perfect preservation, representing three fleurs-de-lis exactly similar to those used on the shield of France. Hence it appears that the use of this emblem in a triple form is much more ancient than is usually thought. (See HERALDRY). Consult Rothery, G. C., 'The fleur-de-lis and its Variations' (in *The Ancestor,* No. II, p. 99, London 1902).

FLEURIEU, flėr-yė, Charles Pierre Claret, COMTE DE, French naval officer: b. Lyons 1738; d. 1810. In 1751 he joined the French navy. With Berthoud he invented the marine watch or chronometer and in 1768 commanded the *Isis* in an expedition to try out the invention. He became inspector-general of ports and navy yards in 1776, was Minister of the Navy in 1790–91 and became councillor of state under Napoleon in 1800. He was appointed senator in 1805, admiral the year following and governor of the Tuileries in 1808. In signing the treaty ceding Louisiana to the United States he was Minister Plenipotentiary of France. His published works include 'Voyage fait par ordre du roi pour éprouver les horloges marines' (2 vols., 1773); and 'Découverte des Français en 1768 et 1769 dans le sud. est de la Nouvelle Guinée' (1790).

FLEURUS, fle-rüs, a town in Belgium, province of Hainaut, on the left bank of the Sambre, seven miles northeast of Charleroi. It has manufactures of coarse woolens and flax, with some tanneries and salt-works, and a trade in agricultural produce. In the vicinity, on 29 Aug. 1622, the Spaniards under Gonzales defeated the German Protestant army commanded by Ernst von Mansfield; 1 July 1690, the French under Luxembourg defeated the allied Dutch, Spanish and German forces; and 26 June 1794, the French republican forces under Marshal Jourdan defeated the Austrians and their allies under the Prince of Saxe-Coburg, forcing thereby the evacuation of Flanders and thus saving France from the menace of invasion. The battle of Ligny also in which Napoleon defeated the Prussians (16 June 1815) is sometimes known as the battle of Fleurus, Ligny being only about two miles from Fleurus. Pop. 6,600.

FLEURY, Andre Hercule de, ān-drā ar-cül de flé-rē, a cardinal and prime minister of France under Louis XV: b. Lodève, Languedoc, France, in 1653; d. 29 Jan. 1743. Coming to court, he won general favor by his pleasing person and fine understanding; became bishop of Fréjus; and, through the interest of Madame de Maintenon, was appointed instructor to Louis XV. In 1726 he was made cardinal, placed at the head of the ministry, and from his 73d to his 90th year administered the affairs of his country with great success.

FLEURY, Claude, clōd, French Church historian: b. Paris, France, 6 Dec. 1640; d. there, 14 July 1723. His learning and unaffected simplicity made him a notable figure at the court of Louis XIV, and later at that of Louis XV, whose confessor he became. An 'Ecclesiastical History' in 20 volumes (1691–1720) forms his claim to enduring renown; the work coming down to 1414, at which point a later writer has attempted, though not sympathetically, to round out the master's performance. 'A History of French Law' (1674) and a 'Historical Catechism' (1679) are less important achievements.

FLEURY, François Louis Teisseidre, MARQUIS DE, French soldier: b. Saint-Hyppolite, Languedoc, 1749; d. 1794. In 1768–69 he served with the French army in Corsica and came to America in 1776 in order to aid the colonies in their struggle with England. In 1777 he was made captain of engineers, took part in the battle of Brandywine, where a horse was killed under him. With John Laurens he attempted to fire the Chew House at Germantown. In October 1777 he became brigade major to Pulaski and was wounded at Fort Mifflin the following month. He was made lieutenant-colonel soon after and took part in the battle of Monmouth. He also served in Rhode Island under General Sullivan and in 1779 became commander of a regiment of light cavalry. In July of that year he was voted a silver medal by the Congress for his gallantry at the engagement of Stony Point, being the first to enter the fort there and taking away the British standard with his own hands. After a short visit to France he was present at the capture of Yorktown. He later returned to France, entered the army there, served in Pondicherry and attained the rank of *maréchal de camp*. Consult Balch, ‘The French in America’ (Philadelphia 1895).

FLEURY, Maurice de, French physician: b. Bordeaux 1860. He received his education at the University of Bordeaux. He served on the medical staff of hospitals in Bordeaux and afterward in a similar capacity in the hospitals of Paris. He has published ‘Contribution à l'étude de l'hystérie senile’ (1890); ‘Traitement rationnel de la neurasthénie’ (1894); ‘Pathogénie de l'épuisement nerveux’ (1896); ‘Introduction à la médicine de l'esprit’ (1897); ‘L'Ame du criminel’ (1899); ‘Le corps et l'âme de l'enfant’ (1899); ‘Manuel pour l'étude des maladies du système nerceux’ (1904); ‘Nos enfants au Collège’ (1905); ‘Bréviaire de l'arthritique’ (1912).

FLEURY, in heraldry, objects adorned with fleurs-de-lis or parts of fleur-de-lis are said to be fleury. See HERALDRY.

FLEURY-HUSSON, Jules. See CHAMPFLEURY.

FLEXIBILITY, in physics, the property which all bodies possess to a greater or less degree, and which is evinced in their disposition to yield or change their form without fracture when a force is applied. See PHYSICS.

FLEXNER, Abraham, American educator: b. Louisville, Ky., 13 Nov. 1866. He is brother of Simon Flexner (q.v.); was educated at John Hopkins (A.B. 1886), Harvard (A.M. 1906) and Berlin in 1906–07. He began teaching at the Louisville High School in 1886; was expert to the Carnegie Foundation for the Advancement of Teaching 1908–12, and in the latter year was appointed assistant secretary to the general education board. He is a Fellow of the American Association for the Advancement of Science and has published ‘The American College’ (1909); ‘Medical Education in the United States and Canada’ (1910); ‘Medical Education in Europe’ (1912); ‘Prostitution in Europe’ (1913), also educational papers in periodicals.

FLEXNER, Simon, American pathologist: b. Louisville, Ky., 25 March 1863. He was graduated from the University of Louisville as M.D. in 1889. He then became a post-graduate student at Johns Hopkins University and subsequently pursued his pathological studies at the University of Strassburg. He was professor of pathology, Johns Hopkins University, 1891–98; and of pathological anatomy 1898–99, and professor of pathology in the University of Pennsylvania 1899–1904. He was also director of Ayer Chemical Laboratory, Pennsylvania Hospital, 1901–03; and pathologist of University Hospital and Philadelphia Hospital 1899–1903. His ability was further recognized by his being chosen in 1903 director of laboratories of the Rockefeller Institute for Medical Research in New York, established to promote the study of the origin of disease. Among his publications are ‘The Pathology of Tox-Albumin Intoxication’; ‘Micro-organisms’; ‘The Bacillus Pyogenes Filiformis’; ‘The Aetiology of Dysentery’; ‘Terminal Infections’; ‘Experimental Pancreatitis’; ‘The Nature of Snake Venoms’; ‘The Serum Treatment of Epidemic Meningitis’; numerous papers on epidemic poliomyelitis, including the nature of its microbic cause, mode of infection, means of prevention, etc., and many other papers and monographs relating to bacteriological and pathological subjects.

FLEXURE, in mechanics, is a species of strain in which a solid body is distorted so that certain of its original planes become converted into cylindrical or conical surfaces. The term is most commonly used in connection with beams, where it signifies the elastic yield of the beam under the influence of its load. When a beam is supported at both ends and loaded in the middle, it sags in such a manner that its originally straight longitudinal fibres become curved into approximately circular arcs. The radius of these arcs is very large, of course, in practical construction, where the beams are composed of steel or wood. In a beam that is supported and loaded as described above, the upper fibres of the beam are in compression, and the lower ones in tension. The compressive strains in the upper parts, and the tensile strains in the lower parts, decrease toward the middle of the beam, and somewhere about the middle there is a surface (called the «neutral surface,» or «neutral axis»), on which there is neither tension nor compression. The flexure of such a beam is measured by the depression of its centre under the influence of the load; this depression being directly proportional to the product of the load by the cube of the length of the beam between supports, and inversely proportional to the continued product of the horizontal thickness of the beam, multiplied by the cube of its vertical depth, and again by the value of Young's modulus for the material of which the beam is made. (See ELASTICITY; STRENGTH OF MATERIALS). Consult also Rankine, ‘Useful Rules and Tables.’

FLICK, Lawrence F., American pathologist: b. Carroll Township, Cambria County, Pa., 10 Aug. 1856. He was educated at the Benedictine College near Latrobe, Pa., and was graduated in medicine at Jefferson Medical College, Philadelphia, in 1879. He took up tuberculosis as a specialty and early in his career began a movement for the prevention of this disease. In June 1888 he read a paper upon the contagiousness of phthisis before the Medical Society of the State of Pennsylvania, showing that houses which had been occupied by consumptives gave the disease to subsequent occupants, and that the malady was essentially a contact disease. He subsequently published many monographs upon this topic, and in 1890 started a movement for the establishment of consumption hospitals which culminated in the founding of the Rush Hospital for diseases of the chest. In 1892 he founded the Pennsylvania Society for the Prevention of Tuberculosis, of which he was president for some years. In 1895 he helped to found the Free Hospital for Poor Consumptives and was elected its president. In 1903 he was entrusted with the establishment of the Henry Phipps Institute for the Study, Treatment and Prevention of Tuberculosis and was appointed its medical director. He has written 'Consumption a Curable and Preventable Disease' (1903); also numerous pamphlets and articles on tuberculosis and pulmonary diseases.

FLICKEL, Paul, German artist: b. Berlin, 8 April 1852; d. 1903. He studied three years in the Art School at Weimar, and in 1874 went to Düsseldorf and in a year began his career as a landscape painter. He traveled for the sake of studying art in Germany and Austria. In 1877 he continued his wandering in Italy and on the spot painted many pictures, such as 'The View of Naples from Capo di Monte'; 'Garden at Monte Carlo'; 'Fountain of the Villa Borghese,' scenes in which he showed a skilful management of bright sunlight effect, and complete mastery in handling the luxuriant vegetation of the south. His pictures of mountain forest scenery in Austria attracted notice and his 'Beech Forest,' which was based on studies made near Prerau, Moravia, gained for him the «Great Gold Medal» at the Berlin Exhibition of 1886. It is now in the National Gallery, Berlin. Among others may be noted 'The Ilse Valley in the Harz' (1888); 'Sylvan Solitude' (1892).

FLICKER, one of the many local names of the North American golden-winged woodpecker (*Colaptes auratus*). The name is derived from one of the bird's characteristic calls. It is also well known as the yellow-hammer or pigeon-woodpecker. A description of the bird will be found under WOODPECKER.

FLICKINGER, Daniel Kumler, American bishop of the denomination of United Brethren: b. Sevenmile, Ohio, 25 May 1824; d. 1911. In 1857–85 he was corresponding secretary of the United Brethren Missionary Society, in 1885 became foreign missionary bishop, and in that capacity made 12 journeys in Africa. His publications, besides a volume of sermons, include 'Off-Hand Sketches in Africa' (1877); 'Ethiopia' (1877); 'The Church's Marching Orders' (1879); 'Our Missionary Work'; 'Fifty-five Years of Ministerial Life' (1907).

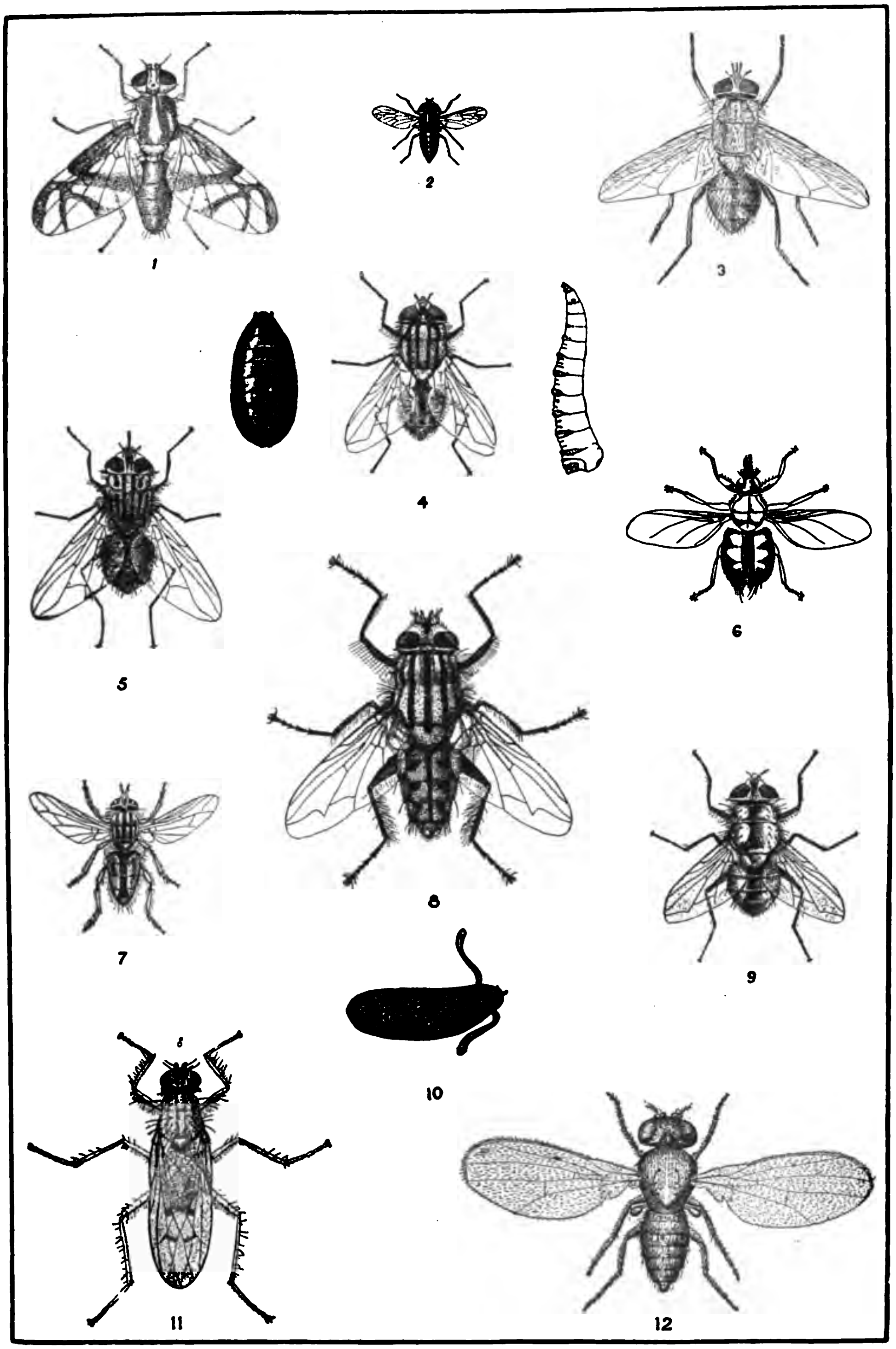
FLIEDNER, flēd'nĕr, **Theodŏr,** German Lutheran clergyman: b. Eppstein, Nassau, Germany, 21 Jan. 1800; d. Kaiserswerth, 4 Oct. 1864. He became pastor in Kaiserswerth 1822. He gradually amassed in this poor parish an endowment fund for a church, school and poorhouse. In 1833 he founded an asylum for released female convicts, and in 1835 an infant school, at Düsseldorf, the earliest in Germany; a similar institution was organized by him at Kaiserswerth, the year following. In the same year he founded the Deaconesses' Association, which was his greatest and most notable work. Among his writings, which are principally devotional and educational, may be mentioned 'Das Buch der Martyrer.'

FLIES, two-winged insects of the order *Diptera* (q.v.), whose larvæ are legless, soft and cruciform and are termed «maggots.» The group is world-wide in its distribution, and probably quite as numerous as either the beetles or the group of wasps, bees, ants, etc. It is now known to contain about 40,000 species, most of which are incalculably numerous in individuals; so that «swarms» of flies is a proverbial expression. Entomologists believe that 8 or 10 times 40,000 species really exist. The vast abundance is due to the plenitude of their food, and to their fecundity; and it is accompanied by a very high state of organization, so that certain families of flies are held by some students to stand at the head of the insect tribe in specialization of structure. Intellectually, however, they are far behind the *Hymenoptera;* and to this fact, to the small size and unattractive appearance of most specimens (although great brilliance of color is to be found among some families), and to the comparatively uniform and uninteresting nature of their metamorphoses, are to be charged the relatively small amount of study that has been given to the group. The life-history of the ordinary flies is detailed below; but many peculiarities exist in other families of the order. «With some,» says Howard, «no eggs are laid, and living larvæ issue from the body of the female. Such flies then become practically viviparous or 'larviparous.' With others, although these are few in number, the development within the body of the female goes even farther, and when the insect emerges from the body of its mother it is already in the pupal condition. Such forms are called 'pupiparous.' . . . Many species — comprising, in fact, whole families — are aquatic or subaquatic in their early stages, and some possess the faculty of living under what appear to be most disadvantageous conditions.» Some of the flies of the family *Ephydridæ* (whose eggs or larvæ are eaten by American Indians,— see KOOCHAH-BEE) live in the strongly alkaline lakes of the Far West where little else can exist.

Flies are mainly day-flies, and fond of sunshine, but some appear only at night or in the dusk; a section of the tribe does not fly at all, being wingless and parasitic. They live in the most diverse manner; some attack large animals and suck their blood; some prey on smaller insects; some suck honey, and in search of it take part in the cross-fertilization of flowers (see FLOWERS AND INSECTS); and many find their food in decaying animal and vegetable matter. A large number of dipterous larvæ eat refuse or carrion,— whence arise serious evils to mankind,— others feed inside growing vegetables; and some maggots prey, or are parasitic upon, other animals.

A type of the group is found in the house-fly (*Musca domestica*), which represents the great family *Muscidæ,* in which most of the familiar flies about houses and stables are included, and its life-history represents that of its kind generally. Its eggs are laid preferably on horse-manure, but also on human or other excrement, decaying vegetables, etc., and hatch in six or eight hours, producing white maggots. These mature in four or five days, when their skins harden and turn brown, forming a puparium, or case, within which the true pupa forms, and five days later gives birth to a per-

HOUSE, STABLE AND GARDEN FLIES



1 Apple-worm Fly
2 Orange-belted Gadfly
3 Horn-fly
4 Common House-fly, with maggot and puparium
5 Stable-fly
6 Forest-fly or Bird-tick
7 Meat-fly
8 American Flesh-fly
9 Green-bottle Flesh-fly
10 Egg of Pomace-fly
11 Dung-fly
12 Pomace-fly

fected fly. Thus a total life cycle requires in midsummer only about 10 days, and a dozen generations may thus be born in warm climates within a single season. As each fly deposits on the average 120 eggs, and as the maggots of 1,200 house-flies may be sustained by a pound of manure, the possible rapidity of their multiplication is apparent. Most flies live but a few weeks, and toward the end of the season they die with great rapidity, becoming infested with reddish mites, which suck their juices, or with fatal fungous diseases. (See FUNGI). In warm houses a few may survive a winter, but as a rule all adult flies die in the fall, and the species survives and recovers in the spring from the eggs or pupa left over winter in the manure-heap or other feeding-place. It is plain that attempts to mitigate the annoyance and danger resulting from many flies may best be directed toward the destruction of their eggs and young. That such destruction is desirable and the duty of society is plain when one considers the vast amount of injury these insects may do. Many sorts attack vegetables and fruit, for example the hessian-fly, which is perhaps the most destructive insect in the United States, the apple-fly, the gall-flies, fruit-midges, potato-scab gnat and others. Others harm domestic animals, as the bot-flies, sheep-ticks, horn-flies, tsetse and all the horse-flies, bee-killing robber-flies and bee-flies, black-flies, mosquitoes and many more. This catalogue of harmfulness (to which can be opposed only the beneficial work done by the tachina-flies which cause the death, by parasitism, of other kinds of injurious insects) becomes of small importance, however, beside the enormous evil flies do in spreading virulent diseases from man to man and place to place. Were this not so it might be true, as formerly alleged, that their services as scavengers, as parasites, and in the cross-fertilization of plants, balanced the damage caused by some, and left something to their credit.

Flies as Carriers of Disease.—Consideration of the habits of house-flies and their relatives will show how prone they are to feed upon excrementitious matter, and to be attracted to any decaying or purulent substance. When this is the product of wounds, sores or diseased bodies it is likely to contain the germs of disease; and these may be sucked into the blood or cling to the body of the insect. If, then, the fly alights upon a human being or a susceptible animal, and punctures the skin with its sucking proboscis (for ordinary flies do not «bite,» properly speaking), it is likely to leave in the puncture some of the germs it has fed upon, and so infect the person with the disease to which they give rise. Wounds may thus be inoculated with «blood-poison»; and certain diseases, grouped as «myiasis,» may arise from taking into the stomach, in eating spoiled vegetables, minute flies (*Anthomyia*) breeding in them. Even vegetable diseases may be so transmitted, as is the case with the «scab» of potatoes, which, according to Hopkins, is spread from plant to plant by the visits of a fungus-gnat (*Epidapus scabiei*).

That this theoretical transmission of disease actually occurred has been demonstrated since the latter part of the 19th century by observation and experiment. It was first ascertained of certain mosquitoes, whose responsibility for much if not all of the malaria from which men suffer was shown. This may be found more fully treated under MOSQUITOES, where the agency of these small ubiquitous flies in spreading other diseases is also shown. Dr. Joseph Leidy attributed the spread of gangrene in the hospitals at Washington during the Civil War to the flies; a few years later it was shown that gad-flies that had settled upon the dung of cattle afflicted with anthrax would communicate the disease to healthy kine. In 1888 an Italian investigator showed that flies fed upon a bacillus culture would drop virulent bacilli in their ordure, capable of infecting new cultures; further experiments in India showed that flies fed with a culture of the bacilli of bubonic plague and of Asiatic cholera survived and conveyed the plague to man. An English physician asserted that typhoid fever was spread by insects; and this was abundantly proved during the prevalence of that disease in the military camps during the Spanish-American War of 1898. Flies which have access to the excreta of patients and afterward alight upon food so infect the food that whoever eats it is in danger of falling ill with the fever. Howard demonstrated that the common house-fly was the principal agent in this transmission. Subsequent investigations showed that the danger of the propagation by flies (and other household insects) was equally great in diphtheria and yellow fever. In another series of cases, as among mosquitoes, the fly acts as intermediary host for disease germs which develop in its blood to the point where they are virulent when introduced into the circulation of man or beast. Such is the case with the African tsetse fly (q.v.), which transmits a greatly dreaded cattle-disease. The purulent ophthalmia, known as «pink-eye,» and particularly prevalent in the South, is facilitated by minute gnats of the genus *Hippelates*.

Dr. L. O. Howard, of the United States Department of Agriculture, has given special attention to this matter, and has found that no less than 77 species of flies frequent human excrement and are therefore liable to obtain and carry disease germs. As the innumerable insects themselves are beyond reach, the measures for protection must be preventive. Dr. Howard says that in order to avoid epidemics of typhoid fever it is necessary to abolish the box privy, prevalent in rural and village districts, and substitute earth-closets, where water-closets cannot be installed; to place stable manure in receptacles and treat it with chloride of lime to destroy the maggots, throwing a shovelful over each day's addition. Pantries, dining-rooms and kitchens should be carefully screened to keep out flies; and especial pains taken in summer to keep flies out of sick-rooms. Detailed instructions and the reasons for them are given by Howard in his pamphlet, 'How Insects Affect Health in Rural Districts,' issued as Farmers' Bulletin 155, by the United States Department of Agriculture.

Classification.—The classification of the *Diptera* has proved difficult. An early division was based on the structure of the antennæ: *Nemocera*—those having the antenna thread-like and with 6 to 36 joints; and *Brachycera*, those with the antenna three-jointed and bristle-like. A later and more widely accepted subdivision was based upon the way the pupa-case splits on emergence of the fly; in the *Orthorapha*, the pupæ escape from the larval skin through a T-shaped orifice; in the *Cyclorapha* the pupæ escape through a circular opening at the anterior end. American entomologists, following the special investigations of D. W. Coquillet, now usually divide the order into two sub-orders based upon the character of the mouth-parts, and characterized as follows:

Sub-order Proboscidea.— Antennæ conspicuous, inserted at upper end of the face, sometimes many-jointed, proboscis usually furnished with terminal lips, body rather soft and brittle, legs approximated, wings usually present and frequently furnished with a discal cell; adults oviparous or larviparous, never in all their stages living externally on mammals, birds or honey-bees.

In this group are placed, in order, the following important families: *Tipulidæ* (crane-flies), *Culicidæ* (mosquitoes), *Cecidomyiidæ* (gall-gnats), *Mycetophilidæ* (fungus-gnats), *Simuliidæ* (black-flies), *Leptidæ* (snipe-flies), *Stratiomyiidæ* (soldier-flies), *Tabanidæ* (horse-flies), *Bombyliidæ* (bee-flies), *Asilidæ* (robber-flies), *Syrphidæ* (syrphus-flies), *Œstridæ* (bot-flies), *Tachinidæ* (tachina-flies), *Sarcophagidæ* (flesh-flies), *Muscidæ* (house-flies), *Anthomyiidæ* (fruit-flies), *Trypetidæ* (fruit-flies), *Ephydridæ* (edible salt-water flies), and *Oscinidæ* (grass-stem flies); besides various less important ones.

Sub-order Eproboscidea.— Antennæ usually inconspicuous, commonly inserted near the middle of the sides of the face and composed of from one to three joints, the apex furnished with a style or bearing several long bristly hairs, proboscis never furnished with terminal lips, body integument tough and leathery, legs on one side of the body usually widely separated from those on the other side, wings, when present, never furnished with a discal cell; adults pupiparous, living externally upon mammals, birds or honey-bees.

This second sub-order comprises only two families the parasitic bird-ticks (*Hippoboscidæ*) and the bat-ticks (*Nycteribidiidæ*), which owe their vernacular names to their resemblance to true ticks in appearance and habits.

Bibliography.— L. O. Howard's 'Insect Book' (New York 1901) contains the most fully illustrated general account of the flies, and also a large list of books on the subject, especially those relating to systematic description. S. W. Williston has an excellent illustrated account in 'The Standard Natural History' (Vol. II). His 'Manual of American Diptera' (New Haven 1896); Comstock's 'Manual for the Study of Insects' (Ithaca, N. Y., 1895); Packard's 'Half Hours with Insects' and 'Text-Book of Entomology'; and Miall's 'Natural History of Aquatic Insects' (London 1895); and Ross's 'The Reduction of Domestic Flies' (Philadelphia 1913), may be consulted with profit.

FLIGHT. Flight, strictly speaking, is progress through the air in any desired direction by any agent or object heavier than the air, as opposed to the floating of an object lighter than the air, such as a balloon. Animals accomplish flight mainly by means of wings, which may be special organs as in the insects, or modified fore legs, as in the case of bats and birds. The wings of insects are always thin membranes supported by a stiffer framework. In bats they consist of extensible membranes stretched over the immensely elongated fingers and joined also to the sides of the body and the hind legs. The wings of birds are composed of long stiffened feathers attached to the rudimentary fingers and to the bones of the forearm; the individual feathers overlapping one another so as to form a continuous more or less arched surface. The tail feathers constitute another sail area which plays an important part in flight, while in many bats a continuation of the flight-membrane between the hind legs has much the same function.

Besides these special organs the structure of aerial creatures is modified in many other respects with a view to facilitating flight. Thus the hollow bones of birds are lighter than the solid bones of terrestrial animals and relieve birds of much unnecessary weight; while the general shape of the bird's body and the smooth rounded contour of its feather covering are calculated to give the least possible resistance to the air during flight. Birds are also provided with large distensible air sacs under the skin, the function of which has been a matter of much dispute, but which, as suggested by von Leudenfeld, may aid in shifting the centre of gravity of the body, a matter of the utmost importance to the bird in holding to its course or in turning in flight. The centre of gravity, we may note, is also kept well below the plane of the wings by the distribution of the heavy parts of the body on the pectoral side. So that as the bird flies the heavy breast muscles, which constitute the bulk of its weight, are well down while the wings are attached to the back of the thorax. Thus the body becomes essentially a weight hung directly below an outstretched sail area.

So much for the general structure of flying creatures. Turning now to the principles of flight we have as the main agencies (1) the muscular propulsion on the part of the bird; (2) the support offered to the "sail area" by the air; (3) the force of the wind, both in raising and in propelling the bird. Mechanical and physical problems are involved in the study of flight which it will be impossible to consider here, but one or two principles may be mentioned which are of fundamental importance, and the application of which may be seen in all forms of flight. We know that the resistance (that is, support) of the air to a flat surface is greatly increased when the surface is traveling rapidly through the air in its own plane, and it follows that when a bird is once on the wing the buoyancy of the air relative to it is greatly heightened; and having gained a certain momentum it will be possible for the bird to sail some distance without loss of altitude. Again when a flat surface is sailing diagonally through the air the maximum pressure (that is, support) of the air is not under the centre of the surface, but under the forward edge. It is on this principle that we find a tendency to force up the anterior edge of the wings of a sailing bird and in order to counteract it the bird is compelled to shift the centre of gravity of its body farther forward. To do this it may draw the wings back, spread the tail or perhaps extend the head and neck. On the same principle to turn the direction of flight it is merely neces-

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sary to flex or raise one wing or one side of the tail. Flight proper may be of two sorts, (1) by flapping the wings, and (2) by soaring. The former is the most familiar and is practised by all birds, while the latter is possible only for birds of large expanse of wing, such as vultures, eagles, gulls, etc.

In taking flight it is very important for the bird to "get a start," as we say; that is, to acquire some relative velocity, and to accomplish this we often see birds which are about to fly run along the ground for a few steps or flap along the surface of the water, while starting head toward the wind with wings properly spread accomplishes the same result. Rising into still air by flapping is very laborious work, and some heavy-bodied birds, as the loons, for instance, are utterly unable to take flight when confined within a small area.

When once in the air and fairly started in flight the wing action is far less laborious than at the start and the upward stroke is often relative to the body only and not necessarily a muscular effort. When this stroke is active, the individual feathers, as instantaneous photographs show us, are more or less separated to reduce the resistance of the air on the recovery. Most birds mingle flapping and straight sailing in various ways and when once on the wing flight is mainly a matter of presenting their sail area to the air currents in such a way as to gain the greatest benefit from them.

Soaring is flight in circles with set wings and without any visible muscular action on the part of the bird. In spite of this the bird is able to mount higher and higher in the air, gaining impetus enough on the flight with the wind to carry it above its initial altitude when returning on the other half of the circle against the wind. Many theories have been advanced to explain the "soaring bird," some of them purely fantastic. This method of flight is possible only in the presence of currents of air; the unequal velocity of air at different altitudes doubtless having much to do with it. It has been ascertained that the flexibility of the tips of the wing feathers of a bird renders soaring possible to it. Mr. Everett H. Bickley, after elaborate experiments, claims to have solved the riddle. "The flexibility of the wing feathers," he says, "act like the flap in a pump valve, which offers resistance to fluid motion in one direction and freedom in another."

Aeronauts naturally look to birds for suggestions in artificial flight. They have paid particular attention to the poise and flight of the herring-gull in arriving at the principles of aerial navigation. The cutting edge of the monoplane from which the machine obtains its lifting capacity corresponds with the cutting edge of a bird's wing, the edge in the case of the bird being composed of living muscle and bone. "The rear edges of the plane can be warped up and down in rough imitation of the twisting of a bird's wing." Professor Ernest Huebner, the distinguished German naturalist, in a series of experiments on the shores of the Baltic Sea, has made the discovery that birds "never cross the seas and oceans except on storm currents and sometimes on the storms themselves." Birds determine from the direction of the wind currents when to start in flight over sea. These currents have tremendous propulsive power and a sustained directness that guides the bird to its destination. Huebner's investigations also demonstrated the fact that bird flight is not affected by temperature, snow or ice and that "only a sudden blizzard from an unknown direction, or a fog, compels the bird to seek refuge on islands or the nearest mainland." These facts have not been lost on aeronauts, and it is believed that the path of the storm will be found materially to assist instead of interfering with aerial flight. The methods of birds in attacking their prey have been copied by air-craft. Birds vary very much in wing power according to their method of flight; the humming-bird and pigeon being abundantly supplied with wing muscles to maintain their rapid strokes, while the frigate-bird, a notorious "sailer," is remarkably weak in muscular development. The speed of flying birds also varies greatly. The best flyers of which we have definite record are the carrier pigeons, which travel from 30 to 50 miles an hour, while an albatross, caught and tagged by sailors, was recaptured, according to Lucas, 12 days later, 3,150 miles distant. Lanchester, the English engineer, says that "no bird can fly more than 50 miles an hour by its own energy, and therefore that tremendous migrating speed is made only on the swiftest wings." A plover can fly at least 76 miles an hour between Nova Scotia and South America.

Our familiar small birds do not travel at anything like such a rate, but their endurance is very great, as we can realize in view of their migrations, which often reach from the northern United States to equatorial South America, while the small waders travel from one end of the hemisphere to the other. See MIGRATION.

Flying creatures occur among mammals, reptiles and fishes. The extinct pterodactyls were evidently experts on the wing, and some of them constituted the largest flying animals of which we have any record. Of mammals the bats are the only true flyers, the flying squirrels and lemurs having merely parachute-like expansions of skin on the sides of the body which when the legs are stretched out enable them to sail obliquely downward from the tree tops to the lower branches.

In the flying-fish (q.v.) there is an enormous development of the pectoral fins which simulate wings. Their flight, however, consists only of a short sail through the air on an impetus gained as they leap from the waves with the fins rigidly extended. Consult Marey, E. J., 'Vol des Oiseaux' (Paris 1890); Roy, Chas. S., article "Flight" (in 'Newton's Dictionary of Birds,' 1896); Langley, S. P., 'The Greatest Flying Creature' (Smithsonian Report 1901); Headley, 'The Flight of Birds' (London 1912); MacMechen and Dienstbach, 'Bird Flight and Aerial Navigation' (in the *Century,* Vol. LXXX, pp. 297-307).

FLIGHTLESS BIRDS. Certain birds are quite unable to fly, or fly very poorly, or use their wings only as paddles or balancers, or in extreme cases have lost not only the use of wings but the wings themselves have disappeared. Examples of this degeneration will be found treated of in the articles upon APTERYX; DODO; GAREFOWL; MOA; OSTRICH; PENGUIN; RATITÆ; SOLITAIRE.

FLINCH, a card game said to have had its origin in Kalamazoo, Mich., and to have been invented by a man named Flinch. The game is played with a pack of 150 cards, numbered consecutively from 1 to 15, there being 10 cards of each numeral. All are of the same color; there are no hearts, diamonds, clubs or spades, and the court cards are, of course, also missing. The cards are shuffled and 10 cards are dealt to each player for his flinch pile, then 5 more to each to play with. Each player must place his flinch stack face up, with only the top card exposed. The other five cards are kept in hand, spread out like a fan to see the numbers. The object of the game is to get rid of the flinch pile, and whoever first succeeds wins the game. To this end the flinch pile must be played from whenever possible. When this is not done, the opponent will call «flinch» and the player will have to draw a card from the opponent's flinch pile and place it on the bottom of his own. In case two or more of the opponents call «flinch» at the same time, the negligent player must draw a card from the pack. The game may be played by any number from two to eight. After shuffling, the entire pack is usually stacked up criss-cross into hands of five, to facilitate drawing new hands. The name is also applied to a somewhat similar game played with the ordinary pack of 52 cards.

FLINCK, Govaert, Dutch painter: b. Cleves, 25 Jan. 1615; d. Amsterdam, 2 Feb. 1660. At Amsterdam, where he took up his permanent residence, he became a pupil of Rembrandt, whose manner and technique he so closely imitated that he comes nearer to the master than any other of his pupils, with the exception of Eeckhout. He was much sought after as a portrait painter and has also left many religious pictures and a few genres, such as 'Die Wachstube,' which is equally Rembrandtesque in subject, conception and treatment.

FLINDERS, Matthew, English navigator: b. Donington, Lincolnshire, England, 10 March 1774; d. London, 19 July 1814. He did much toward mapping out the coastline of Australia. In his first voyage of discovery he sailed in 1795 from Port Jackson and skirting the southeast coast reached Van Diemen's Land, now Tasmania. In a subsequent voyage of discovery, on which he was dispatched by the British government with but poor equipment, he sailed along the south coast to Cape Leeuwin and the bay which now bears his name. He next explored the east coast of Australia, from Port Stephens to Cape Palmentone, threaded the formidable Barrier Reefs and coasted the Gulf of Carpentaria. Then turning back he made for Europe by way of Sydney. He was shipwrecked on this voyage and detained by the French in Isle de France for seven years. From the effects of this imprisonment he never recovered. On his arrival home he published 'A History of Terra Australis.' The coast of South Australia was long called after him Flinders Land. His name is still attached to the southernmost county in Eyre Peninsula and to Flinders Island off that coast; to the Flinders Range in South Australia, rising near the head of Spencer Gulf and running north (highest peaks, 3,100 feet); also to a town in Victoria, 61 miles southeast of Melbourne. Consult Life by Thynne (1896).

FLINDERS-PETRIE, William M. See PETRIE, WILLIAM MATTHEW FLINDERS.

FLINDERSIA (named after Capt. Matthew Flinders), a genus of trees of the order *Meliaceæ*, allied to the mahogany, to which, however, it is generally inferior. The trees of this genus are tall, with a correspondingly great diameter, and furnish large quantities of valuable timber. *F. australis*, the Queensland ash, is used in Australia for staves, etc.; *F. oxleyana* is a hard-wood tree, yielding excellent material for cabinet-work and also furnishing a yellow dye. The wood of *F. greavesii* is used in house-building, for which it is well adapted by its durability.

FLING, Fred Morrow, American historian: b. Portland, Me., 1860. He was graduated at Bowdoin College in 1883 and received the degree of D.Ph. at the University of Leipzig. Since 1891 he has been professor of European history in the University of Nebraska. He founded the Association of the Nebraska Teachers of History in 1897 and is a member of the American Historical Association and of the Société de la Revolution Française. He was one of the 100 electors to the Hall of Fame. He published 'Outline of Historical Method' (1898); 'Studies in Greek Civilization' (1898); 'A Source Book of Greek History' (1907); 'History of France' (1907); 'Source Studies on the French Revolution' (1907); 'The Youth of Mirabeau' (1908); 'Source Problems on the French Revolution' (1913).

FLINT, Albert Stowell, American astronomer: b. Salem, Mass., 1853. He was graduated at Harvard University in 1875 and received the degree of A.M. at the University of Cincinnati in 1880. In 1881–83 and again in 1888–89 he was computor of the United States Naval Observatory and in 1883–88 was assistant to the United States Transit of Venus Commission. From 1889 to 1904 he was assistant astronomer of the Washburn Observatory at the University of Wisconsin, and in the latter year was appointed astronomer. He is Fellow of the American Association for the Advancement of Science. He published 'Meridian Observations for Stellar Parallax' (Vol. IX, Publications of Washburn Observatory, 1902).

FLINT, Austin, American physician: b. Petersham, Mass., 30 Oct. 1812; d. New York, 13 March 1886. He was graduated at the medical department of Harvard College in 1833. After practising in Northampton, Mass., Boston and Buffalo, where he established the Buffalo *Medical Journal* in 1846, he was one of the founders and for six years a professor of the Buffalo Medical College. He was a professor in Louisville University 1852–56; professor of pathology in the Long Island College Hospital in 1861–68; president of the New York Academy of Medicine in 1872–75, and of the American Medical Association in 1884. He was the author of numerous textbooks, clinical reports and medical papers. Consult his biography, by Carpenter (New York 1886).

FLINT, Austin, American physician, son of the preceding: b. Northampton, Mass., 28 March 1836; d. New York, 23 Sept. 1915. He was graduated from the Jefferson Medical College, Philadelphia 1857. For the two years following, he combined the duties of editor of the Buffalo *Medical Journal*, surgeon of Buffalo City Hospital and professor of physiology and microscopical anatomy at the University of Buffalo. He then set up a practise in New York city, and occupied the chair of physiology at the New York Medical College. He filled a similar position at the New Orleans Medical College (1860). After a year of study in Europe, he returned to the United States and taught physiology and microscopic anatomy at Bellevue Hospital, resigning in 1898 to accept the professorship of physiology at Cornell University Medical College (New York city). Dr. Flint's researches in the function of the liver were significant. He demonstrated the separation of the cholestrin from the blood by the liver, and its final conversion into «stercorin,» the factor determining the odor of the feces. In 1874 he was appointed surgeon-general of New York State. He wrote 'The Physiology of Man' (1888); 'Chemical Examinations of Urine in Diseases' (6 eds., 1870–84); 'Effects of Severe and Protracted Muscular Exercises' (1871); 'Source of Muscular Power' (1878); 'Textbook of Human Physiology' (1875); 'Experiments Regarding a New Function of the Liver' (1862); 'The Physiology of the Nervous System' (1872); 'Mechanism of Reflex Nervous Action in Normal Respiration' (1874); 'The Treatment of Diabetes Mellitus' (1884); 'Chemical Examination of the Urine in Disease' (1893); 'Stercorin and Cholesteræmia' (1897); 'Handbook of Physiology' (1905).

FLINT, Charles Ranlett, American merchant: b. Thomaston, Me., 1850. He was educated at the Brooklyn Polytechnic Institute, where he was graduated in 1868. He became a partner in the firms of Gilchrist, Flint and Company, and W. R. Grace and Company, engaged in South American trade. He was appointed consul of Chile at New York in 1879, retaining the position for two years, and later being appointed consul-general of Costa Rica and Nicaragua in the United States. In 1890 he was a delegate to the International Conference of American Republics. In 1895 he supplied a war fleet for Brazil and built torpedo boats and submarines for Russia. He established the Coast Clipper Line in 1896 and in 1898 negotiated abroad for the purchase of warships for the navy of the United States. He also organized several corporations, including the company controlling the street railway system of Syracuse.

FLINT, Joseph Marshall, American surgeon: b. Chicago 1873. He was educated at Princeton and Chicago universities, being graduated from the latter in 1895. He was graduated in medicine at Johns Hopkins in 1900, went abroad and studied at the universities of Leipzig, Vienna, Bonn and Munich. In 1897 he became assistant in anatomy and in 1900 associate at the University of Chicago. He went as assistant to the Johns Hopkins Medical Commission to the Philippines in 1901. From 1901 to 1907 he was professor of anatomy at the University of California, and in the latter year became professor of surgery at Yale. He was editor of the *American Journal of Anatomy* from 1903 to 1907 and has been a frequent contributor to medical journals on anatomy and surgery.

FLINT, Robert, Scottish theologian: b. Dumfriesshire 1838; d. 1910. He was educated at the University of Glasgow, held pastorates at Aberdeen and Kilconquhar in 1859–64, and from 1864 to 1876 was professor of moral philosophy and political economy at Saint Andrews, removing in the latter year to Edinburgh as professor of theology. In 1880 he was Stone lecturer at Princeton and in 1887 Croall lecturer at Edinburgh. He wrote 'Christ's Kingdom on Earth' (1865); 'Philosophy of History in Europe' (1874); 'Theism and Anti-Theistic Theories' (1877); 'Historical Philosophy in France' (1894); 'Socialism' (1894); 'Sermons and Addresses' (1899); 'Agnosticism' (1903); 'Philosophy as Scientia Scientiarum' (1904); 'On Theological, Biblical and Other Subjects' (1905).

FLINT, Mich., city and county-seat of Genesee County, on the Flint River and on the Chicago and Grand Trunk and the Flint and Pere Marquette railroads, 64 miles northwest of Detroit. Flint has a courthouse, the State Institution for the Deaf and Dumb, a private retreat for the insane, a high school, waterworks, gas and electric lights, public library, Federal buildings, courthouse, city hall, a national bank and several daily, weekly and monthly periodicals. The manufacture of automobiles, buggies, aeroplane motors, carriages and varnishes is extensively carried on, and there are also minor manufactures of flour, iron products, electric-stoves, cigars, bricks and tiles. The United States Census of Manufactures for 1914 showed within the city limits 93 industrial establishments of factory grade, employing 9,963 persons; 8,722 being wage earners receiving $7,235,000 annually in wages. The capital invested aggregated $27,151,000, and the year's output was valued at $53,375,000; of this, $18,941,000 was the value added by manufacture. It is well known as a centre for the grain trade, large elevators accommodating this enterprise. Originally settled in 1820 under the name of Grand Traverse of Flint, the city received its charter in 1855. The waterworks are owned by the municipality. The city has about 40 miles of paved streets and there is a sanitary sewers system with an intercepting system to carry sanitary sewage to a disposal plant. There are a large park and boulevard drive system and a large, well-equipped amusement park and many theatres. Pop. 65,000.

FLINT, or FLINTSHIRE, North Wales, a maritime county having on the north the Irish Sea and on the east the river Dee and Cheshire, with the county of Denbigh on the west. Its area is 256 square miles, and it is the smallest county in Wales. The low and sandy coast becomes fertile along the estuary of the Dee. Wheat and oats are the principal crops, and dairy products are manufactured. A range of hills running parallel to the Dee rises in the highest part to 825 feet. Carboniferous rocks underlie Flintshire, and the chief minerals are coal, iron, copper, lead, zinc and limestone. Mining is the principal industry, and there are some manufactures of cotton, pottery, chemicals, etc. The chief towns are Flint and Saint Asaph, Holywell. The county returns one member to Parliament. Pop. 92,700.

FLINT, Wales, a municipal borough and seaport, the capital of Flintshire, 13 miles southwest of Liverpool. It has a handsome parish church in the Gothic style, erected in 1848. Near the town, on the shore of the estuary, stands the ancient castle of Flint, an object of some historical interest. It was completed by Edward I, was the prison of Richard II and was twice taken after siege by the Parliamentary forces in the Great Civil War. It has remained in ruins since 1667. Flint is on the Chester and H. Railroad. Pop. 5,472.

FLINT, a subvitreous variety of quartz, somewhat resembling chalcedony, but more opaque and commonly of a gray or smoky-brown color, darker in the interior than on the surface. It occurs abundantly in the United States and in various other parts of the world. In England and France it occurs chiefly in the chalk formations and a microscopic examination of it often shows the remains of diatoms and other minute organisms, from whose silicious skeletons the silica of the flint was doubtless largely derived. In other cases the flint was probably formed by the replacement of lime by silica held in solution by the ground water. The coloring matter of flint is chiefly carbonaceous matter, with some iron sesquioxide. Flint was used for many ages in the manufacture of stone implements, a use for which it is well adapted by its hardness and also from the fact that it breaks with a conchoidal fracture, leaving sharp cutting edges. Previous to the invention of matches, flints were greatly used for the production of fire, the flint being struck repeatedly against a piece of steel, from which it detached small particles that were rendered red-hot by the friction. These were caused to fall into a mass of very dry and highly inflammable matter, known as «tinder,» which took fire from them as dry grass beside a railroad takes fire from the sparks of passing locomotives. Before the invention of the percussion cap, flints were also used on musket locks, for igniting the powder.

FLINT-GLASS. See Glass, Varieties of.

FLINT IMPLEMENTS, tools, weapons, etc., made of silicious or flinty stones; a term particularly denoting implements used by man before the use of metals. See Stone Age.

FLINT MILL, (1) In pottery, a mill in which burnt flints, having been previously stamped to reduce them below a certain size, are ground to powder for mixing with clay to form slip for porcelain. The flint-mill is a strong circular pan 10 to 12 feet in diameter, having a bottom of quartz or feldspar blocks and a runner or runners of hard silicious stone called chert, lime in any form being inadmissible, as it forms a flux for the other material which would vitrify in the seggars or become blistered by the escape of carbonic acid. (2) In mining, a mode formerly adopted for lighting mines, in which flints studded on the surface of a wheel were made to strike against a steel, the blows producing a quick succession of sparks, which lighted the miner at his work.

FLINT RIVER, one of the largest rivers in Georgia, rising near Atlanta and flowing 350 miles to the extreme southwestern extremity of the State, where it unites with the Chattahoochie (q.v.) to form the Apalachicola (q.v.). It drains an area of 8,000 square miles. See map of Georgia.

FLINTLOCK, the historical lock for firearms, in which the cock held a piece of flint and came glancing down upon the steel cap of the pan which contained the priming. See Firearms; Musket.

FLITTERMOUSE. See Bat.

FLOATING BATTERY, a vessel strengthened so as to be shot-proof, or as nearly so as possible, and intended for operating in comparatively smooth water, for defending harbors or attacking fortifications. Floating batteries were employed by the French to contest the passage of the Saint Lawrence by the British at the siege of Quebec in 1759 and afterward by the British to clear the river. The most notable attempt to make use of floating batteries against maritime fortresses, till the time of the Crimean War, was during the siege of Gibraltar in 1782, when batteries of this description, invented by the Chevalier d'Arcon, were employed at first with considerable effect. On this occasion, however, they turned out in the end a complete failure, being destroyed by the red-hot shot directed against them from the fort. After this failure no more attention was paid to them until Napoleon III suggested the use of floating batteries, protected by iron plates, in attacking the Russian fortresses in the Black Sea and the Baltic. The suggestion was actually carried out and the floating batteries then constructed proved very effective in 1855, during the operations against Sveaborg and Kinburn, as well as on subsequent occasions.

FLOATING BEACONS. See Buoy; Lighthouse.

FLOATING BRIDGE. See Bridge.

FLOATING DOCKS. See Harbors, Docks and Breakwaters.

FLOATING FERN. See Ferns and Fern Allies, *Filicales* (4).

FLOATING GARDENS. See Floating Islands.

FLOATING HOUSES, abodes so constructed as to be movable at will upon the surface of a river or other water. Floating houses form whole streets in Bangkok, being anchored in rows and capable of being moved from one position to another. From the depth of water, large vessels of from 200 to 300 tons burden can sail up to this picturesque town and pass along the houses of the inhabitants. These floating houses are made of bamboo stems, wicker-work and palms, with a veranda in front; and they are built on large rafts. See Bangkok.

FLOATING ISLANDS, islands formed either by the aggregation of driftwood in rivers and the deposition thereon of soil and vegetable matter, or by the detachment of portions of a river bank or lake shore. Tall trees are sometimes seen standing erect on such islands as they are carried down by the river current. Floating islands are sometimes seen 50 or 100 miles distant from the mouth of the large rivers of America, Asia and Africa. Portions of the alluvial soil from river-deltas, held together by the roots of mangroves and other trees, are sometimes detached by hurricanes or typhoons and then swept out to sea; such islands have been met with in the Philippines, in the seas of the East Indies and in the Pacific. A floating island is mentioned by Herodotus as existing in Egypt. In that country blocks of jungle growth composed in part of masses of papyrus, called *sudd*, obstruct the river, and have been known to stop entirely the navigation of the White Nile. They are so firmly compressed by the force of the current that men can walk over them. Some of these blocks or floating islands removed in 1902 were a mile long and 20 feet thick. Floating islands were known to Roman writers. Those on Lake Vandimona were, according to the younger Pliny, capable of supporting sheep. Loch Lomond in Scotland long possessed a floating island, which has now, however, disappeared or become attached to one of the stationary islands of the loch. In Ireland large masses of peat float about some of the bogs. In England, in Lake Derwentwater, there is an instance of an island which appears and disappears from time to time in the same spot. Perhaps the most satisfactory of the many theories which have been proposed to account for this phenomenon is that which attributes its rising from the bottom of the lake, where it ordinarily rests, to the permeation of its mass by marsh-gas during hot weather, the upward motion being assisted by the growth of bouyant water-plants on its surface. Between 1696 and 1829, similar islands were observed at irregular intervals, generally, however, after great droughts and violent storms, in Lake Ralang in the Swedish province of Småland. Oceanic floating islands sometimes perform important service in the transportation of vegetable seeds from place to place, also in the distribution of animal species, by carrying insects, land mollusca and small mammalia, more rarely reptiles. Darwin met with islands floating on Lake Tagua-Cagua in Chile which passed from side to side of the lake and carried cattle and horses as passengers. In northern India and on the borders of Tibet, and in Persia, floating gardens are often erected by the natives for the purpose of raising melons, cucumbers and other similar vegetables and plants, which require a very aqueous soil for their cultivation. These gardens, however, are of a very fragile nature, and rarely exceed a foot in depth of soil, their prime structure being composed of wicker-work, interlaced with reeds and wattles and covered with matting, over which the earth is placed. In the Vale of Cashmere the lakes contain floating gardens devoted to the same purpose, but these are in reality portions of the marshy ground made to float artificially by cutting through the roots of the reeds and other plants about two feet below the surface. The Chinese, too, devote considerable attention to this style of horticulture, but more by way of ornamentation. Floating gardens, or *chinampas*, also existed in Mexico before the Spanish conquest. Clavigero describes them as formed of wicker-work, the stems of water-plants, and mud, the largest sometimes having on them a tree or a hut. Both flowers and vegetables were grown on them.

FLOAT-STONE, a variety of opal, or hydrated silica, occurring in concretionary masses of such a porous texture that they float on water. They are of a gray or white color, break with uneven fracture and sometimes have a hard nucleus of flinty appearance.

FLOATS. (1) In angling, the quill or cork from which the bait line is suspended, and whose motion indicates the bite of a fish. (2) An inflated bag or pillow to sustain a person in the water. (3) The small piece of ivory on the surface of the mercury in the basin of a barometer. (4) The hollow, metallic ball of a self-acting faucet, which floats on the water in the cistern or boiler. (5) A raft, or collection of timber fastened together for conveyance down a river. (6) In hydraulic engineering, one of the boards or paddles attached to the radial arms of a paddle wheel or water wheel. (7) In machinery, a single-cut file, or one in which the teeth are parallel and unbroken by a second row of crossing teeth. The usual horizontal obliquity of the teeth relatively to the central line of files is 55 degrees, but single-cut files are much less inclined, and the teeth of floats are sometimes square across the face of the file. (8) In plastering, a plasterer's trowel used in spreading or floating the plaster on to a wall or other surface. The long-float is of such a length as to require two men to use it. The hand float is that in ordinary use. The quick-float is used in finishing moldings. An angle-float is shaped to fit the angle formed by the walls of a room. (9) In masonry, a polishing-block used in marble working; a runner. (10) In shoe making the serrated plate used by shoemakers for rasping off the ends of the pegs inside the boot or shoe. (11) In tempering, a contrivance for affording a copious stream of water to the heated steel surface of an object of large bulk, such as an anvil or die in the process of tempering. The rapid production of steam prevents the constant contact of cold water when the object is merely dipped, as a body of steam intervenes. The dashing stream of water constantly exposes a new body of water to the hot surface and makes the hardening more complete. (12) Theatrical: A stage name for the footlights, derived from the use of a row of oil-pans, with floating wicks, along the stage front, previous to the invention of gas. (13) A trench for navigation. (14) A notice of intention to occupy lands in tracts of the United States newly opened for settlement.

FLODDEN, hamlet in Northumberland, England, about five miles southeast of Coldstream, near which was fought the celebrated battle in which James IV of Scotland was defeated by the Earl of Surrey (9 Sept. 1513). An unhewn pillar of granite now marks the spot where the Scottish king was slain. See SCOTLAND.

FLODOARD, flŏ'dō-är, French ecclesiastic chronicler: b. Epernay, 894; d. 966. He received his education at Rheims and was made canon of the cathedral there. He was twice deprived of his benefices by the Comte de Vermandois, because of his opposition to the latter's infant son to appointment as archbishop. In 952 he entered a monastery, where he devoted himself to literary work. His 'Historia Remensis Ecclesiæ' is his most important work. He built it up from original texts which he reproduced in full. From 919 to 966 he wrote year by year the 'Annales,' which are of great historical importance by reason of the author's probity. His poetical works are also of great interest historically. For the 'Annales' consult Picard, 'Collection de textes' (Vol. XXXIX, Paris 1905). Consult Molinier, 'Les sources de l'histoire de France' (Vols. I, V, Paris 1902; 1904).

FLOE-RAT. See Seals.

FLOGGING, the infliction of stripes or blows with a whip, lash or scourge, especially as a judicial punishment. In Britain it long existed as a punishment in the army and navy; but it was totally abolished in the former in 1881, and in the latter it is practically extinct. It was made a punishment for certain violent crimes, such as garrotting, in 1863; and for juvenile offenders in 1847 and 1850. In these cases, however, the number of stripes is limited by law, 50 being the maximum in some instances, 25 in others and so on. A judge in sentencing a prisoner to flogging must specify the instrument and the number of stripes. In the case of juveniles under 14 years of age the instrument must be a birch rod, and the number of stripes must not exceed 12. As a punishment for school children it has been abolished in most civilized countries, although many people still believe in its efficacy. In many parts of the United States it is illegal to use it in schools. In English schools, especially in some of the old public schools, it still survives. The punishment of the knout in Russia and of the bastinado in the East are severe forms of punishment. In the United States flogging was discontinued in the navy and on merchant vessels in 1850. In the army, it was abolished 1861. As a means of prison discipline, it has been used till very recently, but has no longer any official standing. For the subject of its use as a legal punishment for certain offenses, see Corporal Punishment; Whipping Post. Consult Napier, Sir C. J., 'Remarks on Military Law and the Punishment of Flogging' (London 1837); Salt, H. S., 'The Flogging Craze, etc.' (London 1916).

FLOOD, Henry, Irish orator and politician: b. near Kilkenny 1732; d. Farmley, County Kilkenny, Ireland 2 Dec. 1791. He was educated at Trinity College, Dublin, and Christ Church, Oxford, entered the Irish Parliament in 1759 and soon became the most prominent and eloquent member of the popular opposition. He was privy councillor for Great Britain as well as for Ireland 1775–81 and vice-treasurer for Ireland 1775–81. In 1783 he had a personal dispute in the house with Grattan, when a remarkable display of the power of invective was made on both sides. In the same year he became a member of the British Parliament for Winchester and later for Seaford. By his will he left part of his considerable property to Trinity College, Dublin, for the establishment of a chair of Gaelic and the purchase of Gaelic books. The will, however, was contested and the gift was declared void. Two of his speeches were published in book form (Dublin 1787; London 1790). Others are to be found in 'The Parliamentary Register, etc., of the House of Commons of Ireland, etc.' (3 vols., Dublin 1784); and in Caldwell, J. 'Debates Relative to the Affairs of Ireland, etc.' (2 vols., London 1766). Consult Bowers, C. G., 'The Irish Orators, etc.' (Indianapolis 1916); Flood, W., 'Memoirs of the Life and Correspondence of Henry Flood' (Dublin 1838); Froude, J. A., 'The English in Ireland' (2 vols., London 1903); Grattan, H., 'Memoirs of the Life and Times of Henry Grattan' (5 vols., London 1839–46); Hardy, F., 'Memoirs of the Earl of Charlemont' (London 1812); Hunt, W., ed., 'The Irish Parliament, 1775' (London 1907); Lecky, W. E. H., 'History of England in the 18th Century' (8 vols., London 1878–90); id., 'Leaders of Public Opinion in Ireland' (2 vols., New York 1873); MacNeill, J. G. S., 'The Constitutional and Parliamentary History of Ireland till the Union' (Dublin 1917); Mountmorres; Lord, 'History of the Irish Parliament' (2 vols., London 1792); Parsons, Sir L., 2d Earl of Rosse, 'Observations on the Bequest of Henry Flood to Trinity College, Dublin' (Dublin 1795); Rodd, T., ed., 'Original Letters from Lord Charlemont, etc., to the Right Hon. Henry Flood, etc.' (London 1820).

FLOOD PLAIN, the plain formed by a river in broadening its valley. The first work done by a river is to cut a trench-like valley; this having been cut so deeply that the slope of the river-bed toward the sea so slackens the current of the river that it cannot carry its load of detritus, this detritus is partly dropped. Then the upbuilding of the river channel causes the river current to swing from side to side. In this way first one side, then the other of the valley is attacked by the river. In time of flood the plain of waste thus accumulated may be entirely covered by the swollen river. The flood plain of the Mississippi west of Tennessee is 50 miles wide. See Rivers; Valleys; Geology.

FLOODS. See Hydraulic Engineering.

FLOODS AND INUNDATIONS are caused by excessive rains, giving rise to an overflow of the rivers; by the bursting of the banks of rivers, lakes and reservoirs; by the sudden melting of ice and snow; and by irruptions of the sea, produced by high tides, wind-storms driving the sea-water inland, earthquakes, volcanic outbreaks and the bursting of sea banks. The felling of forest trees throughout extensive tracts of mountainous country also tends to make the rivers which have their origin there swell rapidly after a heavy rainfall; good and complete drainage of land has the same tendency. (For the Noachian flood, see Deluge). The subjoined list embraces some of the most disastrous floods and inundations of which we have record.

684. A.D. Japan; 780 sq. m. of Isle of Shikoku covered by sea.

968. Persian Gulf; many cities destroyed and new islands formed by irruption of sea.

1014. Many English seaports destroyed by sea.

1098 or 1100. East of Kent inundated; Goodwin Sands formed.

1100 or 1108. Flanders inundated.

1161 or 1165. Sicily; irruption of sea; thousands drowned.

1170. Holland and Friesland; great flood.

1173. Holland; Zuyder Zee much enlarged.

1219. Nordland, Norway; lake burst; 36,000 people perished.

1228. Friesland; invasion of sea; 100,000 people drowned.

1277. Friesland; the Dollart formed.

1286–87. Holland on both sides of Zuyder Zee inundated in consequence of a storm.

1396. Holland; islands of Texel, Vlieland and Wieringen separated from mainland, and Marsdiep, the channel between Texel and North Holland, formed.

1421 or 1446. Holland; 72 villages inundated, of which 20 permanently, about 100,000 persons drowned, Biebosch formed east of Dordrecht, and this town separated from mainland.

1521. Holland; 100,000 lives lost by an inundation.

1570. Holland; storm drove in the sea, destroying numerous villages and 20,000 people in Friesland.
1617. Catalonia, Spain; 15,000 perished in floods.
1629. Mexico (city) inundated.
1642. China, at Kaifong; 300,000 drowned.
1646. Holland and Friesland inundated; loss of life, 110,000.
1726. Floods and inundations all over Europe.
1745. Peru; Callao destroyed by irruption of sea caused by earthquakes.
1767. England; irruption of sea on east coast.
1782. Formosa; west side of island submerged, and Taiwan destroyed.
1787–88. India, in Northwestern Provinces and Punjab; 15,000 lives lost by floods.
1791. Cuba; floods from excessive rain; 3,000 drowned.
1811. Hungary; 24 villages swept away by overflow of Danube.
1813. Austria, Hungary, Poland and Prussian Silesia; floods caused by rains; 4,000 perished in Poland, 6,000 in Silesia.
1824. Saint Petersburg and Cronstadt; 10,000 lives lost from overflow of Neva.
1825. Denmark; sea broke through from North Sea to Limfjord making northern Jutland an island; one-third of Friesland submerged.
1840. France; overflow of Saône and Rhone swept away many villages and inundated Lyons, Avignon, Nîmes, Marseilles, etc.
1851. Northern China; Yellow River burst its banks, and made a new outlet into Gulf of Pechili.
1852. Floods throughout Europe from Belgium to Switzerland.
1856. South of France; floods did damage to extent of $28,000,000.
1868. Peru; Arica and Iquique nearly destroyed by earthquake waves.
1874. United States; Mill River Valley (Mass.) inundated by bursting of a dam; 144 drowned. Also floods in western Pennsylvania; 220 drowned.
1875. Disastrous floods throughout central Europe, in United States, Burma, India and West Indies.
1876. China; floods in northern provinces; in Bengal 200,000 persons perished from inundation of a tidal wave.
1883. Java and Sumatra; parts submerged by volcanic wave. (See Krakatoa).
1887. China; the Hoang-ho in Ho-nan; millions of lives lost.
1889. Johnstown, Pa.; reservoir burst; 2,209 lives lost.
1891. Consuegra, Spain; 1,200 lives lost.
1893. Queensland; great destruction of property.
1896. Japan; 27,000 lives lost.
1900. Galveston, Tex.; 6,000 lives lost and 3,000 buildings destroyed.
1903. Kansas City, Mo., and Mississippi River towns; millions of dollars in property destroyed.
1903. Heppner, Ore.; cloudburst; 300 lives lost.
1910. Paris, France; rising of Seine; loss of property $200,000,000; loss of lives unknown.
1910. Annam; 1,000 lives lost.
1911. Owari Bay, Japan; inundation; 100 lives lost.
1911. Philippine Islands; tidal wave; 850 lives lost.
1911. Japan; typhoon; 500 lives lost.
1911. China; Hoang-ho River; 5,000 lives lost.
1911. China; Yang-tse Kiang River formed lake 80 miles long, 35 miles wide; 100,000 lives lost, 3,750,000 persons homeless.
1911. Formosa; typhoon; 500 lives lost.
1911. Austin, Pa.; town destroyed; 100 lives lost.
1911. Holland; coast inundated; 240 lives lost.
1912. Omsk, Asiatic Russia; 168 lives lost.
1912. Bolivar County, Miss.; 200 lives lost; property loss, $45,000,000.
1912. Guanajuato, Mexico; 300 lives lost.
1912. Japan; typhoon; 400 lives lost.
1912. Nago, Japan; 282 lives lost.
1912. China; coast inundation; 700 lives lost.
1912. Philippine Islands; 500 lives lost.
1912. Central America; 1,000 lives lost.
1913. Arabia; 350 lives lost.
1913. Ohio and Indiana; 730 lives lost; 60,000 buildings flooded; property loss, $180,873,000.
1913. Kathiawar, India; 800 lives lost.
1913. Bengal; 500 lives lost.
1913. Japan; typhoon; 1,000 lives lost.
1913. Constantinople; cloudburst; 260 lives lost.
1913. Texas; 500 lives lost.
1914. China; West River Valley; 3,300 lives lost; 3,000,000 homeless; $43,000,000 property loss.
1915. China; West River country; 80,000 lives lost.
1915. Galveston, Tex.; inundation; 300 lives lost, property loss, $5,000,000.

FLOOR. (1) *In architecture and building,* the lower surface of the different levels of a structure; the material on which one stands and walks and that bears the furniture. By extension the entire story, as a first-floor apartment. The most common material for flooring is wood, made in matched boards, which are forced together and nailed to the joists or beams. A high type of wood floor is made double, with the first thickness of boards often at an angle with the walls and the surface boards, carefully cut and fitted to a pattern, blind-nailed to the sub-surface. Very ornamental woods are sometimes employed and artistic patterns followed. Since concrete construction came in, the tendency to all-fireproof construction has led to making floors of concrete, and for ornament a pattern of tiles is often set in a bed of cement or asphalt. In less costly construction, a semi-fireproof condition is obtained by placing asphalt or asbestos paper between layers of boards. Modern steel and concrete buildings are now commonly made with floor beams of steel or reinforced concrete, with flattish arches of masonry between, which may be smoothed over on top so as to make a concrete or cement floor. In factory buildings, by a recent refinement of fireproof method, the floors are sometimes slightly sloped and guttered, so as to carry off water like a ship's deck. When water is turned on to quench a fire it runs off to conduits arranged so that there is no flooding of the floors below. (2) *In geology and archæology,* the part of a cavern corresponding in situation to the floor of a house. Here frequently there is now cave earth, covered, and therefore hermetically sealed for the purpose of the investigator, by stalagmite, which has been formed by droppings, from the stalactites hanging from the roof. (3) *As a nautical term,* the bottom part of the hold on each side of the keelson; the flat portion of a vessel's hold. (4) *In hydraulic engineering,* the inner piece of the two which together form the bucket of an overshot water wheel. (5) *In mining,* the bottom of a coal seam; the underlay on which the coal, lead or iron ore rests.

FLOOR-CLOTH, or OIL-CLOTH. A stout canvas cloth, heavily painted, for use as a floor covering. The basis of floor-cloth is a strong, open canvas, woven of flax, with a slight admixture of hemp. Owing to its great width, sometimes six to eight yards, it has to be woven in special looms. It is made in lengths of 100 or more yards. A length of 60 to 100 feet is stretched in a frame, brushed with glue-size and rubbed with pumice stones. It then receives two or three foundation coats of paint on each side. A thick paint is used commonly made of linseed oil and ochre and laid on with a trowel. Each coat on the front is smoothed with pumice-stone. When this operation is completed the cloth is transferred to the printing-room, where the pattern is printed by blocks, as in calico-printing. There is a block for each color. See LINOLEUM.

FLOQUET, flō-kā, **Charles Thomas,** French statesman: b. Saint Jean de Luz, 5 Oct. 1828; d. Paris, 18 Jan. 1896. He began life as a lawyer in Paris, where he defended the Republican journalists. On the fall of the empire he was appointed one of the deputy mayors of Paris, but was forced to resign on account of his complaisance toward the Red Republicans. Later he was elected to the Paris municipal council and in 1876 became one of the deputies for Paris. He sat in the Chamber till 1882, when he was appointed prefect of the Seine;

re-entered the Chamber in 1882 and was elected its president in 1885, but resigned in April 1888 to become Prime Minister. In 1889 he was again elected president of the Chamber. He aspired to the presidency of the republic for which office he was the Radical candidate in 1887; but his career was cut short by the Panama Canal scandal and he lost his seat in the elections of 1893, but was elected to the Senate in 1894.

FLOQUET, Pierre Amable, pē-är ä-mäbl, French historian: b. Rouen, France, 9 July 1797; d. Formentin, 6 Aug. 1881. He made Normandy's annals and personages the objects of his painstaking study in ‹Norman Anecdotes›; ‹History of the Parliament of Normandy› (1840–43); and ‹Studies in the Life of Bossuet› (1885), the last two of which were crowned by the Academy.

FLOR, Roger di, military adventurer: b. Brindisi, about 1262; d. 4 April 1306. At the age of eight he went to sea in a galley belonging to the Templars. Later he entered the order and became commander of a galley. In Palestine he was accused of robbery in 1291, was denounced by the Pope and escaped to Genoa, where he entered on a career of piracy. He entered the service of Frederick, King of Sicily, by whom he was made vice-admiral. In 1303 he induced Frederick's mercenaries to fight against the Turks who at that time were ravaging the Eastern Empire. Roger's services were accepted by the Emperor, he was adopted into the imperial household and appointed commander of the army and fleet. He entered Asia Minor and warred with considerable success against the Turks. In 1304 he rescued Philadelphia from the Turks. He plundered the Greeks and his forces were depleted by the latter. Roger intrigued against the Emperor, but the young Emperor, Michael Palæologus, unable to oppose him openly with success, invited him to Adrianople, where he contrived his assassination. His death was avenged in a fierce war with the Greeks. Consult Pears, ‹Destruction of the Greek Empire› (London 1903).

FLORA, Ill., city in Clay County, 95 miles east of Saint Louis, on the Baltimore and Ohio Railroad. It is the seat of Orchard City College and contains a Carnegie library, butter and ice cream factories, a canning establishment, dehydrating plant and a railroad roundhouse and repair shops. The city owns the waterworks and electric-lighting plant. Pop. 2,704.

FLORA, the Roman goddess of flowers and spring, whose worship was established at Rome in the earliest times. She is represented as a beautiful female, with a wreath of flowers on her head or in her left hand; in her right hand she generally holds a cornucopia. Her temple at Rome was situated near the Circus Maximus, and her festival, the Floralia, was celebrated from 28 April to 1 May. The later Romans identified Flora with the Greek goddess Chloris.

FLORA, the plant-life collectively of any given space. Thus botanists speak of the flora of meadows in distinction from that of forests, of a desert, of the seacoast, etc.; also locally of a state, county or other specified district. Paleontologists use the term with reference to geological periods, as the flora of the carboniferous period, or of the Florissant beds. The word in short is the botanical equivalent of the zoological term fauna (q.v.).

FLOREAL, flō-rā-äl («month of flowers»), the eighth month in the calendar of the first French republic (1794). It began 20 April and ended 20 May. See CALENDAR.

FLORENCE, William Jermyn (stage name of BERNARD CONLIN), American comedian: b. Albany, N. Y., 1831; d. Philadelphia, Pa., 1891. He began his career as an actor at Brougham's Lyceum, New York, in 1850, and soon became a great favorite with the public, especially in such characters as ‹Bob Brierly›; ‹Sir Lucius O'Trigger,› which latter he played to Joseph Jefferson's ‹Bob Acres› with great success in a series of joint performances during the last two years of his life. He was the author of several Yankee and Irish plays.

FLORENCE, Ala., city and county-seat of Lauderdale County, on the Tennessee River and on the Southern and the Louisville and Nashville railroads. Here are located Florence Synodical Female College, the State Normal College, Mars Hill Academy, Florence Institute, Paxton High School and a Congregational school. There is a beautiful park of 250 acres. During the Civil War a military road was built by Jackson from New Orleans to Nashville, which passes through Florence. Important industries are the manufacture of wagons, stoves, boilers and cotton goods. With the proposed development of the great water power supplied by Muscle Shoals, Florence anticipates great increase in manufactures. The Muscle Shoals Canal terminates here, and affords an outlet for trade. Settled in 1819, it was chartered in 1889, and in 1914 voted to be governed on the commission plan. Pop. 6,689.

FLORENCE, Colo., city in Fremont County, 30 miles northwest of Pueblo, on the Atchison, Topeka and Santa Fé, the Denver and Rio Grande and other railroads and on the Arkansas River. It is popular as a summer resort and has important coal-mining and petroleum industries. The waterworks are the property of the municipality. Pop. 2,712.

FLORENCE (Italian, *Firenze*), Italy, province in the region of Tuscany; area, 2,261 English square miles. The surface is beautifully diversified by mountains, valleys and plains. The climate is generally mild and healthy, and the soil very fertile, producing wheat, maize, beans and all kinds of leguminous crops. The vine, olive, orange, citron and fig thrive well in the low grounds; while the mountainous districts afford excellent pasture, admirably adapted for the rearing of sheep. The minerals include mines of copper, lead and mercury; and quarries of marble, alabaster and fine building stone. Pop. 1,028,740.

FLORENCE (Italian, *Firenze;* Latin, *flos,* a flower, and *florere,* to bloom, etc.), Italy, metropolis of Tuscany, capital of the province also called Florence. It is exceeded in number of inhabitants by six of the other Italian cities; in distinction and interest, however, it is surpassed by Rome alone.

Situation and Climate.— Florence is built on both banks of the Arno at a point (lat. 43° 46′ N. and long. 11° 15′ E.) which is properly characterized as the true centre of Italy in the sense that it is the point of intersection of the two great routes, from Rome to Milan and central Europe, and from Pisa to Bologna and Venice. In this circumstance we find the explanation of the development of its commerce during the Middle Ages and the diffusion of its language in all parts of Italy. (See ITALY — LANGUAGE AND LITERATURE). For good weather, the month of May is to be commended as perhaps the most perfect. Autumn is apt to be cloudy; in winter icy winds from the Apennines blow bitterly down the valley of the Arno; during summer the heat is often overpowering: «*il caldo di Firense*» is the Italian way of saying «hot as Florence»; and that has become proverbial.

Early History.— In its origin, probably Etruscan, Florence absorbed colonists whom the Romans called Tuscans and who, three centuries before the foundation of Rome, established a kingdom extending between the shores of the Mediterranean at the mouth of the Arno to the Apennines. Sylla, as proconsul, embellished the town; Attila's hordes reduced it to ashes; 250 years later Charlemagne rebuilt and favored it; next, Countess Matilda, sovereign lady over all Tuscany, presented it to the Holy See. That donation was ratified by the Florentines, indeed, but not by Frederick Barbarossa, who, esteeming himself the successor of the Roman emperors, in 1153 conferred the investiture upon Guelph of Este.

Guelphs and Ghibellines.— Pope Innocent III maintained his claim by force of arms. Forthwith Italy was divided into two hostile camps. Florence itself, however, declined to take sides positively until, in 1215, the blood-feud of the Buondelmonte and the Amadei, both powerful Florentine families, proved to be the origin of that famous quarrel which, century after century, distracted all Italy with civil wars, led to the exile of the greatest citizens and made the peninsula an easy prey to invaders. Florence constituted itself an independent republic. Then the Emperor Frederick II, intent upon recovery of domain over Tuscany, joined forces with the Amadei (politically, the Ghibellines) and drove the Buondelmonte partisans (the Guelphs) from Florence. Thus banished, the Guelphs fortified and held Valdarno (1247), and from that time the two parties (the Ghibelline, party of the Emperors, and the Guelphs, naturally or necessarily driven to embrace the cause of the Popes) contended for supremacy. Reconciliation was indeed arranged; but it was merely a truce, for then the factions known as «Whites» and «Blacks» revived such contentions as had become traditional; and in 1301 Charles of Anjou, at the request of the Pope and the Neri («Blacks»), crossed the Alps, entered Florence, and banished the «Whites»— among whom was Dante Alighieri.

The Plague.— In 1348 the plague («coming from the East,» it is asserted) caused the death of 100,000 Florentines, according to Machiavelli. That disaster set loose elemental passions, and in that century the strife between families of the old aristocracy — that of birth — merged in a more significant struggle between the people (*Popolari*) and a new aristocracy of wealth. At the beginning of the 15th century the Popolari were in power. Then it was that the Medici family began to exercise influence over the masses.

The Medici.— First of that family to receive notice, Giovanni, who died 28 Feb. 1428, was merely a merchant prince; but his son Cosimo (known as Cosimo the Elder and «Father of the Country») laid the foundation of the fame of his house. Official authority he neither possessed nor desired, since he governed by moral supremacy to which the people gave voluntary adhesion, and which became his family's hereditary privilege — to such degree that in course of time Florentines came to regard the Medici as the natural depositaries of power. Cosimo's grandson was that Lorenzo who fairly earned and by his personality added new meaning to his title «the Magnificent.» All-powerful in Tuscany from 1469 to 1492, he is identified with a period in a century that brought forth lovers of beauty, lovers of learning, lovers of adventure; discoverers or creators in many a field; the Florentine Vespucci, whose name was to be given to all the New World. Machiavelli wrote concerning Lorenzo as follows: «He governed the republic with great judgment, and was recognized as an equal by various crowned heads of other countries. He was the greatest patron of literature and art that any prince has ever been, and he won the people by his liberality and other popular qualities. By his political talents he made Florence the leading state in Italy, and by his other qualities made it the intellectual, artistic and fashionable centre of Italy.» He it was who caused Ghirlandaio's frescoes in Santa Maria Novella and Santa Trinità to be painted — a detail to which we refer because we wish to speak again about Ghirlandaio. Only by courtesy a «prince,» the Magnificent Lorenzo neither held nor claimed official rank. The first Grand Duke of Tuscany, Duke of Florence (1519–74), was a member of a lateral branch of the family de Medici, the line of Cosimo the Elder failing. Last of the Medici line in office was Gian. Gastone (1723–37) who, as Yriarte writes, was «a queer mixture of virtue and vice, but at his death the people remembered only his goodness and the generous use he made of the money that might have been spent upon pomp and show.» His sister survived till 1743, when the grand-ducal house of Medici became extinct.

Amerigo Vespucci.— The reader is referred to the articles AMERICA: a brief account of the derivation and meaning of the word, and VESPUCCI, AMERIGO, for facts in relation to the native of Florence who has clearest title to undying fame. But this is the appropriate place for citation of an interesting passage in Mr. Davies' 'Ghirlandaio.' Mr. Davies writes that the fresco by Ghirlandaio at Florence in which occurs Amerigo Vespucci's portrait was overlooked by earlier writers. Vasari says that Ghirlandaio's first paintings were «in Ognissanti, the chapel of the Vespucci, where is a Dead Christ and some saints and above in the arch a Misericordia; in which is the portrait of Amerigo Vespucci who made the navigation to the Indies.» The fresco with the Vespucci family above was whitewashed over in 1616, the chapel having passed to the possession of the Baldovinetti family, and it was lost to sight practically until the end of the 19th century. It is in two parts, the lower part being a

Descent from the Cross, the upper part showing the Madonna della Misericordia spreading her mantle wide over the members of the Vespucci family. It is to the upper part of the fresco that the chief interest attaches, owing to the presence there, as Vasari assures us, of Amerigo Vespucci. The explorer, whose name was to be given to half a world, was, when this picture was painted, still trying to learn Latin, wherein he failed, and astronomy, wherein he succeeded, from his uncle Giorgio Antonio Vespucci. «The bright-faced boy whose head only is seen to the left of the Virgin is said to be Amerigo. He is judged to be about 20 years old — to myself he would seem younger.» In this fresco «there is not a face which does not carry with it a sense of character — not one which does not convince us that we are looking at the very people who lived in the Vespucci home in Florence and spent their festa days and Sundays on the family estate at Peretola, with the boy who was to be so famous.»

After the Medici.— Tuscany fell, when the centuries of control by the Medici ended, to a Duke of Lorraine (afterward Emperor Francis I) whose wife was Maria Teresa. In 1799 the French expelled the grand duke and in 1801 Tuscany (as the «Kingdom of Etruria») was presented to Infante Louis of Parma. In 1808 ceded to France, a scant six years later it was given back to Grand Duke Ferdinand — who in 1859 was compelled to abdicate. The following year, Tuscany became a part of the progressive kingdom of Victor Emmanuel, and, from 1863 to 1871, was its capital; but then, surrendering its pre-eminence to Rome, it thereby escaped some of the predestinate innovations that have defaced the latter; howbeit the reign of Victor Emmanuel was, as Augustus J. C. Hare says, «commemorated by the tasteless front of S. Croce and the total destruction of the noble walls which enriched the city, and which made Florence, with the exception of Rome, unique among European capitals.» See also ITALY for leading national events.

Florentine Art.— The discriminating passage that follows forms part of a valuable study by Mr. Bernhard Berenson: «Florentine painting between Giotto and Michelangelo contains the names of such artists as Oreagna, Masaccio, Fra Filippo, Pollainolo, Verrocchio, Leonardo and Botticelli. Put beside these the greatest names in Venetian art, the Vivanni, the Bellini, Giorgione, Titian and Tintoret. The difference is striking. The significance of the Venetian names is exhausted with their significance as painters. Not so with the Florentines. Forget that they were painters, they remain great sculptors; forget that they were sculptors, still they remain architects, poets and even men of science. They left no form of expression untried; to none could they say, 'This will perfectly convey my meaning.' The history of the art of Florence never can be, as that of Venice, the study of a plain development. Each man of genius brought to bear upon his art a great intellect, which, never condescending merely to please, was tirelessly striving to reincarnate what it comprehended of life in forms that would fitly convey it to others, and in this endeavor each man of genius was necessarily compelled to create forms essentially his own. But because Florentine painting was pre-eminently an art formed by great personalities, it grappled with problems of the highest interest, offered solutions that can never lose their value.»

Essential Characteristics of the Florentine Genius.—Yoiarte (see *Bibliography*) writes that «Italy in the 13th century carried on and brought to its crowning point the work of civilization which France in the 12th century had started by means of the crusades, the establishment of communal franchises and the foundation of the University of Paris. The symbol of the successive labor of generations, representing runners passing their torches from hand to hand, had never been realized with so much grandeur. The sacred torches had fallen from French hands, and had been picked up by Italy, in whose grasp they emitted a light which dazzled the whole world.» But at that time «even Rome, like the rest of Italy, acknowledged the superiority of Florence, for she, together with Siena, had been the first to make the onward move. In the course of a century, from Dante and Giotto to the first of the Medici, from the two Pisani to Brunelleschi, Donatello and Alberti, Florence reached the summit of human thought, and the apogee of plastic beauty.» When it seemed as if she must have been exhausted by the efforts which resulted in the birth of the Renaissance, Tuscany was about to produce the two human beings, Leonardo da Vinci and Michelangelo, who in the domain of art bring more nearly home to us the divine origin of our poor humanity. And again, «Florence has a strong claim upon our affections, for she is the mother of all those to whom the intellect is more than the body.» The name of the men of genius exclusive of artists who gave Florence her unrivaled position is legion, beginning with Dante and ending with Galileo. The most illustrious were Petrarch, Boccaccio, Marcilio, Ficino, Pico della Mirandola, Machiavelli, Brunelleschi, Politian, Alberti, Savonarola — that is to say, historians, poets, artists and philosophers — and the only explorer (among great ones) whose fame has so vastly exceeded, we venture to say, his own estimate of the merit of his real achievement. Universality and versatility have been the clearly marked characteristics of Florentine genius.

Important Buildings.— The Duomo, begun by Arnolfo di Lapo toward the close of the 13th century, continued by Vespignano, Taddeo Gaddi and Andrea Orgagna, and finished in the 15th century by Filippo Brunelleschi, forms, with associated buildings, the most impressive architectural group. Beside it rises the tower by Taddeo Gaddi, who followed the design of his master, Giotto; over against which stands the Battisters di San Giovanni (Octagonal in form) with its incomparable Ghiberti door. The church of San Lorenzo, founded ih 1390 and rebuilt by Brunelleschi, contains the tomb of Cosimo, «Father of the Country,» and of his father, the merchant prince, Giovanni; and in its sacristy are the celebrated monuments by Michelangelo, of Giuliano de Medici and Lorenzo, Duke of Urbino. Adjoining the church is the Laurenziana Library, which Michelangelo planned, and Vasari, his loyal disciple and friend, completed. The church of Santa Croca, begun in 1294, was adorned by Cimabues and Giotto's paintings. Arnolfo was architect of that church and also of the Palazzo Vecchio, begun four years later. The Loggia dei Lanzi

(Andrea Orgagna, architect) looks out on an open square and is famous (to speak quite frankly) because it is a moderately successful Renaissance adaptation of motives in architecture and sculpture supremely realized at Athens during the age of classic perfection. The Palazzo Pitti, begun by Brunelleschi and completed by Ammanato, contains not only the splendid gallery of paintings, but also a library with unique treasures. Next to be appreciated is Brunelleschi's church of Santo Spirito; and by no means to be overlooked are the palaces Riccardi and Strozzi, the two most important theatres, the Accademia di Belle Arti, the Magliabechiana Library, the Galleria degli Uffizi, with its inestimable collection of paintings, statues, bronzes, etc.

Character of Inhabitants.— The Florentines are polite, industrious, temperate, active, economical and of courteous bearing; and though talkative and sometimes satirical, we must account them sweet withal and of amiable disposition. Moreover, in Boccardo's Italian 'Encyclopedia,' their city of flowers that displaces, according to tradition, a field of lilies, is described as «the pleasantest in all Italy.»

Education.— See the study of this subject in the general article ITALY, with its subdivisions.

Industries.— Manufactures of wool, silk and wood, together with goldsmith's work and the agricultural products of the fertile valley of the Arno, in days of old enriched Florentine merchants; and the value of the chief materials of commerce was enhanced by the touch of that fine artistic hand distinguishing Florentine craftsmen. Commerce approximated art. In recent years the tendency has become apparent to specialize strictly art products and to «manufacture» them on a large commercial scale. Art is tending toward shrewd commercialization, though its splendid traditions are still traceable in such minor works as the modern mosaics, the wood-carvings and stained glass. Other products, also noteworthy, are jewelry, silk and porcelain.

Population.— The estimated number of inhabitants of the commune of Florence was given as 242,147 on 1 Jan. 1915. Accordingly it ranked as seventh among the cities of Italy in respect to population, being exceeded by Naples, Milan, Rome, Turin, Palermo and Genoa.

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MARRION WILCOX.

FLORENCE, S. C., city and county-seat of Florence County, on the Atlantic Coast Line and the South Carolina Western systems. It is the centre of trade for the surrounding region, trading considerably in tobacco and cotton. The preparation and manufacture of these products are the important industries. The South Carolina Industrial School, a Federal building, national cemetery and an old Confederate prison comprise the chief points of interest. The municipality owns and operates its waterworks and sewage plant. It has been governed under the commission plan since 1913. Pop. 7,100.

FLORENCE CRITTENTON MISSION. An organization of national scope founded by Charles Nelson Crittenton in honor of his deceased daughter Florence. He gave up his business and spent most of his time in establishing homes and schools for the care of friendless, homeless and unfortunate girls. In 1895 the work in various cities was combined under the charter of the corporation known as the National Florence Crittenton Mission. There are 68 homes and schools in the United States and five abroad.

FLORENCE OF WORCESTER, English chronicler: d. 1118. He was a monk of Worcester, wrote 'Chronicon and Chronicis,' a compilation from Marianus, an Irish monastic chronicler, which is of the highest authority in early British and Irish history.

FLORENTINE EXPERIMENT, in physics, an experiment made in 1661 by some academicians at Florence to test whether or not water was compressible. They enclosed it in a globe of thin gold, afterward hermetically sealed. In compressing the globe the water, instead of yielding, forced its way through the pores of the gold, and stood in drops on its outer surface. See PHYSICS.

FLORENTINE FRESCO, a variety of fresco painting, first practised at Florence during the flourishing period of Italian art, for decorating walls. Like common fresco, the lime is used wet, but in this process it can be moistened, and kept damp and fit for painting upon.

FLORENTINE LAKE, in painting, a pigment prepared from cochineal. It is now obsolete, the greater durability in oil-painting of the lake prepared from madder having entirely superseded those prepared from cochineal.

FLORENTINE MOSAIC, the term applied to the art of inlaying tables and other plane surfaces with *pietra dura* and *pietra commerse,* carried on principally at Florence. See ART; FLORENCE; ITALY.

FLORENTINE SCHOOL, an Italian school of painting during the 14th and 15th centuries remarkable for greatness; for attitudes seemingly in motion; for a certain dark severity; for an expression of strength by which grace is perhaps excluded; and for a character of design approaching to the gigantic. The Tuscan artists, satisfied with commanding the admiration, seem to have considered the art of pleasing as beneath their notice. This school has an indisputable title to the veneration of all the lovers of the arts, as the first in Italy which cultivated them. See ART.

FLORES, flō'rāz, **Juan José,** Venezuelan soldier and statesman: b. Porto Cabello, Venezuela, 1801; d. Guayaquil, Ecuador, 1 Oct. 1864. He distinguished himself as Bolivar's lieutenant in the war that secured the independence of South America. In 1823 he was governor of Pasto, and head of the army in Ecuador. His victory at Tarqui (1828) ended the war with Peru and he was made President of the republic of Ecuador (1831–35). He filled the same office in 1839 and from 1843 to 1845, when he resigned in consequence of a revolution stirred up by the Liberals. He was defeated by Mosqueza in the war with Colombia at the battle of Cuaspuda, in 1863.

FLORES, Venancio, vä-nän'thi-ō, South American soldier and statesman: d. Montevideo, Uruguay, 19 Feb. 1868. In 1853 he took part in an insurrection against Giro, the President of Uruguay, and was elected President of the Republic in January 1854. The two parties in the government were the Colored (Liberals), and the Whites (Conservatives), and the former being the stronger had elected Flores. A division in this party made it possible for a former President, Oribe, to land with troops, and Flores laid down his office, and in 1858 took refuge in Buenos Aires. He returned later and with the help of Brazil stormed the city of La Floradi in 1864 and in 1865 made a triumphant entry into Montevideo, and assumed the title of provisional governor of the republic. On 4 May 1865, he concluded a treaty of alliance with Brazil and the Argentine Republic in the war against Paraguay. He won over the party of the Whites by his clemency, regained the presidency in 1866, but was assassinated on his way to the city hall, or capital of Montevideo.

FLORES, flō'res. (1) *Endé* or *Mandfirei Floris,* a large island (Dutch) of the Indian Archipelago, forms one of the chain of islands which extend east from Java; length, about 225 miles; breadth, about 35 miles. It has a mountainous surface, with several volcanic peaks, of which Lobetob is 7,425 feet high and Gwnong Rokka 7,940 feet. Little is known of the interior. Sandal-wood, once abundant, has become scarce. Endé, near the middle of the south coast, is said to be the principal port, and to have safe anchorage for any number of ships. The passage between the east end of the island and those of Solor and Adenara is called Flores Strait; and the part of the Pacific north of the Flores chain and south of Celebes is called the Flores Sea. The population is estimated as 250,000, and almost wholly Papuan savages. (2) The most western island of the Azores, about 30 miles long by 9 miles broad, with a hilly surface, containing an extinct crater now converted into a lake. The chief products are wheat, pulse and poultry, and great numbers of small cattle are reared. (3) An island of the North Pacific, off the west coast of Vancouver's Island; lat. 49° 20′ N; long. 126° 45′ W; length, northwest to southeast, 15 miles; breadth, from two miles to six miles. (4) A department, also a small island off the coast of Uruguay. (5) A river in Brazil in the province of Piauhy.

FLOREZ, flō'reth, **Henrique,** Spanish historian: b. Valladolid, Spain, 14 Feb. 1701; d. Madrid, 20 Aug. 1773. He was an Augustinian ordinary who taught theology and history by presenting dogmas and annals from the standpoint of their human interest. 'Sacred Spain' (1747–73), and 'Memorials of Catholic Queens' are his most important works.

FLORIAN, flō-ryäṅ, **Jean Pierre Claris de,** French poet: b. near Anduza, Gard, France, 6 March 1755; d. Sceaux, France, 13 Sept. 1794. He made his début with some pleasing farces (1779), and added greatly to his fame with the two pastoral stories, 'Galatea' (1783), and 'Estelle' (1787), sentimental romances in the dominant taste of that time. He also wrote 'Medleys of Poetry and Literature'; and Florian's Youth,' in which he recounts the story of his boyhood. In 1788 he became a member of the French Academy. While there, engaged in finishing his poem, 'Ephraim,' he was arrested by the orders of the Committee of Public Safety, but the fall of Robespierre saved him from the guillotine.

FLORIAN, Saint, a martyr honored as the patron Saint of Upper Austria. Puoche was said to be the site of his tomb and there was built the great monastic house of the canons regular of Saint Augustine which still exists. According to tradition Florian suffered martyrdom by being thrown into the Enns, weighted with a stone, during the prosecution of Diocletian. Tradition also has it that his remains were removed to Cracon in the 12th century. Florian is generally represented as a warrior holding a vessel from which flames are poured out. His protection is often sought against fire. In the calendar of saints he is honored on 4 May. Consult Cahier, C., 'Caractéristiques des saints' (Paris 1867).

FLORIANOPOLIS, Brazil (formerly Desterro, Nossa Senhora do Desterro, or Santa Catharina), the capital of the state of Santa Catharina. It is situated on a long and narrow island near the mainland, and its foreign trade passes through the port of São Francisco, which is one of the best on the coast of southern Brazil. This city is finely built. A wide plaza occupies the centre of the city, around which are grouped the principal buildings: the arsenal, lyceum and hospital. There is a well-fortified harbor and considerable trade in rice, coffee, sugar, manioc flour and artificial flowers. During the revolt of the navy in 1893 Florianopolis was the headquarters of the rebellion. Pop. 30,000.

FLORICAN, or **FLORIKIN,** large game birds of India comprising the genus *Sypheotis bengalensis,* and closely connected with the bustards. They are powerful flyers, are very wary and are greatly prized as food. They offer good sport for the hunter in winter. Consult Baker, 'Journal of the Bombay Natural History Society' (Vol. XXI, Bombay 1912).

FLORICULTURE IN AMERICA.— Growing flowers as a business was unknown in America previous to about 1825; and, indeed as late as 50 years ago it was impossible to buy cut flowers in some of our leading cities. Owing to the increase of population of the Eastern cities, and consequent increase of wealth and luxury, a demand for flowers began to be felt in the second quarter of the last century; and thus began the development of commercial floriculture in this country. This branch of horticulture first became prominent in the vicinity of Philadelphia and Boston. In the early days more wealth was centred in these cities, and the people there paid more attention to luxuries in home surroundings. New York was less prominent in the development of this industry. From 1830 to 1840 floriculture made considerable progress, owing to improved methods in the construction and management of greenhouses, as well as to the increased demand for flowers. The application of hot-water heat to greenhouses gave an impetus to the work, making it possible to grow better plants than had been done when heated air conducted through brick flues was the only means of keeping out the frost. After the Civil War the development of the industry was rapid and varied, as to extent and methods, and as to the kinds of flowers cultivated. Up to about 1885 the cultivation of plants was the leading feature of floricultural work; but since that time the rapid increase of wealth and luxury in the large cities has developed a tremendous demand for cut flowers, thus making this branch of the business the all-important one for the florist. This increased demand for cut flowers has led to specialization in floriculture and has produced the best work of the florist. Older flowers, such as the once popular camellia, have been dropped, and the rose, carnation, violet and chrysanthemum have been substituted. In this way floriculture, as we find it to-day, has been gradually evolved. There are two distinct departments of the work, viz., the growing of plants, and the cultivation of cut flowers. The plants grown mostly are various kinds of palms, ferns, rubber plants and dracænas; also ornamental and bedding stock for outdoor purposes. There has been specialization in both of these main branches of floriculture. For instance, certain growers devote all their energies to palms; other concentrate on ferns; others raise bedding-plants exclusively. In flower-growing there has been even greater specialization; and it would now be difficult to find an important establishment where more than one of the leading flowers is grown. While one florist will grow roses exclusively, another will devote all his time and ingenuity to the improvement of the carnation, a third will grow nothing but violets, and a fourth will concentrate on chrysanthemums. These four flowers are the most important cut flowers, their commercial importance being in the order named. The most recent statistics on floriculture in the United States, those of the census of 1910, show that the total number of farms and florists' establishments reporting the production of flowers and plants in 1909 was 10,614; the total acreage reported as devoted to these products was 78,248 and their value was $34,872,000. The acreage of flowers and plants increased 96.1 per cent between 1899 and 1909, while the value increased 85.9 per cent, the value per acre thus showing a decline during the decade. About 99 per cent of the value of flowers and plants in 1909 was produced in 7,444 establishments that had an output valued at more than $250, the average value for these establishments being $4,630. As would be expected a large part of these establishments were located near large cities. The leading States in value of flowers and plants were:

New York	$5,110,000
Pennsylvania	3,761,000
Illinois	3,681,000
New Jersey	2,839,000
Massachusetts	2,432,000
Ohio	2,357,000
California	1,374,000
Indiana	1,202,000
Michigan	1,132,000
Connecticut	1,042,000

No other State reported the value of flowers and plants as great as $1,000,000.

Since the figures given above are something less than the wholesale price, and the profit of the retailer is about 100 per cent, it is clear that the public spends annually some $70,000,000 on flowers.

See BOTANY; PLANT BREEDING; HORTICULTURE; FLOWER; FLOWERS AND INSECTS; GARDEN; INFLORESCENCE; GREENHOUSE; CROSS-FERTILIZATION; FERTILIZATION, etc.

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FLORIDA (Sp. «flowery,» a name given to the country by Juan Ponce de Leon because he discovered it on Easter Day, Sp. *Pascua florida* or *de flores*, «flowery Easter,» or, according to some authorities, on account of the exuberance of flowers which he saw), the southeasternmost State of the North American Union, sometimes called «the Everglade State,» and also «the Peninsular State.»

Boundaries, Area, etc.— It is situated between lat. 24° 30′ and 31° N. and long. 79° 48′ and 87° 38′ W. Alabama and Georgia bound it on the north, the Atlantic Ocean on the east. On the south, Florida Strait, which connects the Gulf of Mexico with the Atlantic, separates the peninsula from Cuba and the Bahamas. West of the peninsula and south of the western extension of the State is the Gulf of Mexico. The extreme western boundary is the Perdido River which separates it from Alabama.

Florida is mainly a peninsula of irregularly rectangular form. The northern part is continental, and extends about 400 miles from east to west. From north to south the peninsula extension is about 375 miles in length, and nearly 100 miles in width, the total length of the State north and south being about 450 miles. From Biscayne Bay, near its southeastern extremity, stretches a series of islets or keys, the most important being Key West, situated at the lower end of the chain. Its area is 58,666 square miles, 3,805 being lakes, lagoons and rivers. Its coastline, excluding islands is 1,145 miles, 470 miles of it facing the Atlantic Ocean.

Geology.— The oldest formation recognized in Florida is the Vicksburg limestone of the Oligocene period. It is composed of the shells of foraminifera and also of larger shells and is in most places of a thickness of several hundred feet. Over this Vicksburg limestone especially in the northwestern part of the State are the so-called Alum Bluff and Chattahoochee formations lying at or near the surface. On the Hillsborough and Manatee rivers these formations are visible. The Miocene formations in the State consist of the Jacksonville limestone and Choctawhatchee shell marls. They lie at or near the surface along the Apalachicola River and from Jacksonville south. Marine shell marls, hard rock and pebble phosphate deposits of the Pliocene period are frequent in the southern part of the State and are exposed on the Caloosahatchee. Coral formations abound along the Keys. Under the Everglades lie the Miami oölite limestone, and oölite deposits are also frequent in the southern Keys. More recent formations are shell mounds, sand dunes, Indian mounds, etc. From the above it is seen that the only foundation rock throughout the State is limestone, topped by other limestone, shell marls, sands, clays, etc. For many years it was thought that the State was made up exclusively of alluvial deposits, then a theory of coral formation was broached about 1850 only to give way 30 years later to the demonstrations of Eugene A. Smith and others, who showed conclusively the exact geological age and construction of the several underlying strata. Since 1907 the official survey under the State geologist, E. H. Sellard, has solved many of Florida's geological problems.

Topography.— The physical features of the State are decidedly dissimilar to those of the other Southern States. The geological upheaval resulting in its formation left neither table-land nor mountain from which to view ocean and gulf, the most elevated portion of the State barely reaching the dignity of a hill country. The northwestern part, continuing the Alabama uplands, is a hilly rolling country sinking to a flat strip of coast. The east is part of the Atlantic coastal plain. The peninsula is a surface of sand and marsh. A ridge running north and south forms a divide and separates the streams to the east and west. Its greatest elevation is almost 300 feet. From the central ridge low sand-terraces decline each way to the sea, with countless swamps and lakes at their bases. On the higher levels the terraces are covered with a magnificent growth of large pine trees; on the lower levels are prairies and marshes timbered with cypress-trees, and in which are «hammocks,» which are dry elevations covered with a great variety of hardwood and cabbage-palms. The basins of the draining streams are mostly marshy jungles of canebrake and vines and semi-tropical trees. In the southernmost portion are the remarkable Everglades, forming a district 160 by 60 miles in extent, estimated at 5,000 square miles, both land and water, and overflowed marsh hidden by tall grass, and thickly dotted with dry «hammocks,» covered by a jungle of vines and shrubs, pine and palmetto. The eastern part is a maze of these islands and small shallow bayous. The Everglades are separated from the gulf by extensive cypress swamps; the forests extend down the west coast, narrowing out around the cape, and stretch up along the Atlantic coast. The Everglades are now being drained and many hundreds of acres of fertile lands are being put under cultivation there. See EVERGLADES.

The Coast.—The Florida coast-line, excluding islands is 1,145 miles in length, of which 470 miles are on the Atlantic Ocean. This stretch of 470 miles is bordered by a line of sand reefs, sand-spits, and narrow islands, which enclose bodies of water, variously termed lakes, lagoons, bays, etc. This is also typical of the whole southern coast. In recent years these bodies of water have been connected by a series of canals so that an inner passage by water is now possible for almost the entire length of the eastern coast. The chain of islets, known as the Florida Keys are now connected with the mainland and with one another by a railroad which extends southward to Key West. On the Atlantic coast the principal harbors are those of Fernandina, Saint Augustine and Miami. Much of the Gulf coast is also bordered with low sand reefs and islets. From the Western border to the Ocklocknee embouchure it is marked by sand bars; thence to Tarpon Springs it is free of indentations and sand bars but very low and flat. Sand bars are again a feature of the coast between Tarpon Springs and the embouchure of the Caloosahatchee, and from there to the Keys it is low and swampy. Tampa, Key West, Pensacola, Santa Rosa, Saint Andrews, Saint Georges, Apalachee, Hillsboro, Charlotte, Oyster, Ponce de Leon and Cedar Keys are the principal bays and harbors on this coast.

Lakes and Rivers.— The central part of the State contains a very great number of lakes, approximately 30,000 in all. They are mostly due to depressions caused by the solution of the limestone underlying the greater part of the State. Many of the lakes are aggregates of the great springs, some of which are charged with carbonates and sulphuretted hydrogen; many contain fresh water and are of immense size, and of crystal clearness. The wonderful Silver Spring, at the head of navigation on the Ocklawaha River near Ocala, Marion County, has an estimated outflow of 300,000,000 gallons daily. The Blue, in the same county, the Wekiva in Orange County, and the Wakulla near Tallahassee, are also famous. The largest lake is Okeechobee in the south, 1,200 square miles in area and 25 feet above sea level, its waters sinking into the Everglades; a bordering rim of sand about 25 miles wide divides it from the Atlantic. Other lakes are Monroe, Georgia, Kissimmee, Crescent, Dexter, Apopka, Harris, Orange, Tohopekaliga, Istokpoga, and Eustis. Most of these are shallow and are usually connected by fresh water streams. There are many swamps within the State; the largest are the Big Cypress Swamp to the west of the Everglades and Okefinokee Swamp which extends over the Georgia border in the north.

The drainage system of the State is peculiar in the number of subterranean streams, such as are common in limestone regions. The great river of Florida is the Saint John's, rising in Cypress Swamp, just west of the Everglades and flowing north parallel with the ocean, threaded on a series of lakes; 150 miles from its mouth it becomes a mile wide, and in its lower course six or seven, a miniature Amazon

FLORIDA

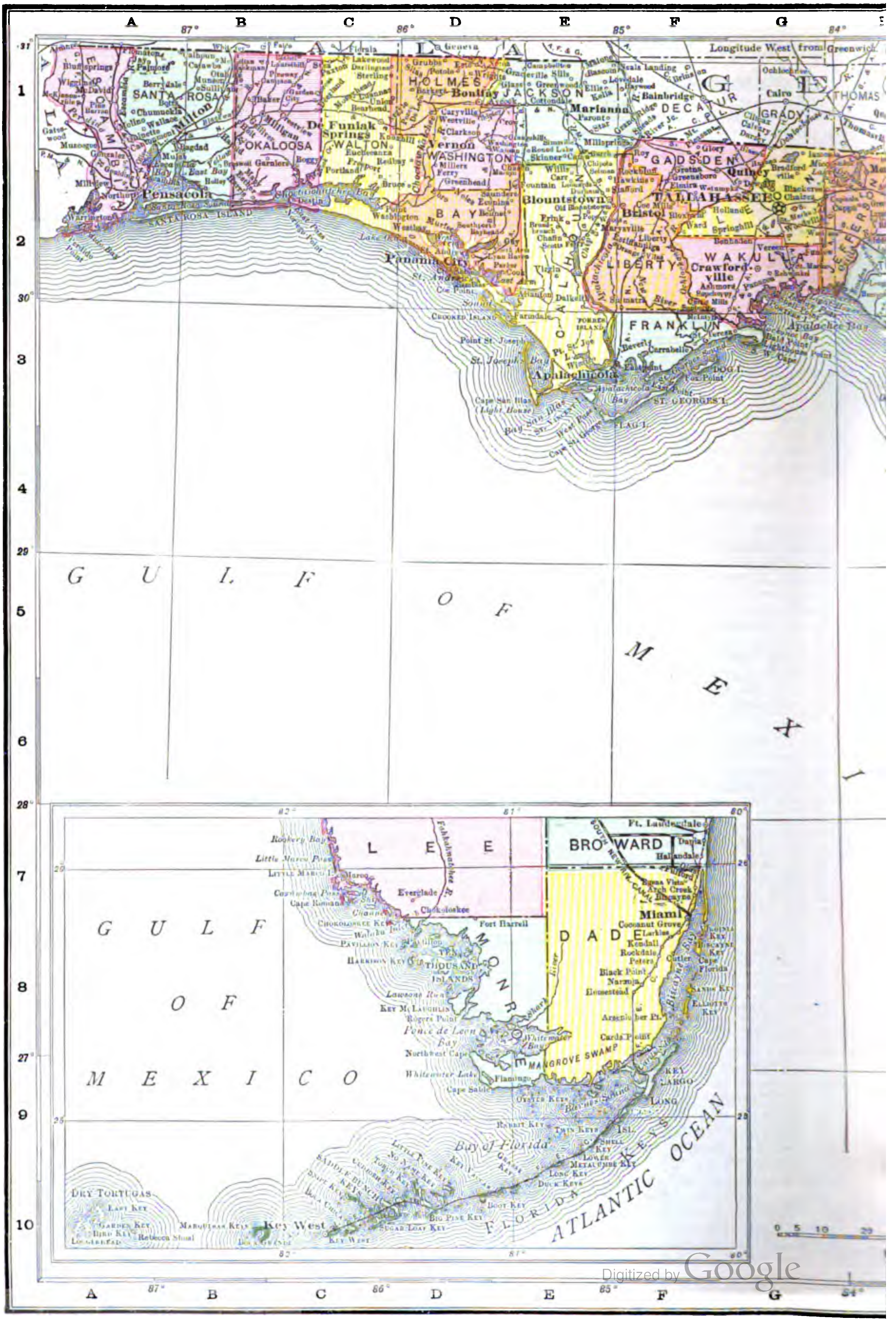
Estimated Population, 893,493

COUNTIES

Pop. 1915		
35,366	**Alachua**	K 3
5,136	**Baker**	K 2
13,518	**Bay**	D 2
16,778	**Bradford**	K 2
7,270	**Brevard**	N 6
4,763	**Broward**	F 7
7,468	**Calhoun**	E 2
5,235	**Citrus**	K 5
7,315	**Clay**	L 3
16,024	**Columbia**	J 2
24,536	**Dade**	F 8
22,194	**De Soto**	M 8
94,834	**Duval**	L 2
41,147	**Escambia**	A 1
......	**Flagler** (Pop. incl. in St. Johns and Volusia Cos.)	M 4
5,433	**Franklin**	F 3
22,989	**Gadsden**	F 1
12,484	**Hamilton**	J 2
6,291	**Hernando**	K 5
83,682	**Hillsborough**	K 7
14,097	**Holmes**	D 1
35,351	**Jackson**	E 1
16,196	**Jefferson**	H 2
7,860	**Lafayette**	I 3
12,421	**Lake**	L 5
8,684	**Lee**	M 10
20,135	**Leon**	G 2
11,992	**Levy**	J 4
4,920	**Liberty**	F 2
17,834	**Madison**	I 2
15,736	**Manatee**	K 8
28,757	**Marion**	K 4
19,618	**Monroe**	E 8
10,005	**Nassau**	L 1
......	**Okaloosa** (Pop. incl. in Santa Rosa and Walton Cos.)	B 1
......	**Okeechobee** (Pop. incl. in Osceola, St. Lucie and Palm Beach Cos.)	N 8
15,397	**Orange**	M 6
10,937	**Osceola**	M 7
9,669	**Palm Beach**	N 9
9,634	**Pasco**	K 6
18,814	**Pinellas**	G 7
37,423	**Polk**	L 7
15,863	**Putnam**	L 3
20,745	**Santa Rosa**	B 1
9,453	**Seminole**	M 5
13,473	**St. John**	M 3
8,589	**St. Lucie**	N 8
7,517	**Sumter**	K 5
20,286	**Suwanee**	I 2
10,783	**Taylor**	H 2
21,790	**Volusia**	M 4
7,606	**Wakulla**	G 2
16,474	**Walton**	C 1
11,123	**Washington**	D 2

Incorporated Cities, Towns, and Villages

Pop. 1915		
744	**Alachua**	K 3
406	**Anthony**	K 4
3,400	**Apalachicola**	E 3
598	**Apopka**	L 5
3,504	**Arcadia**	L 8
282	**Archer**	K 4
3,412	**Bartow**	L 7
250	**Bell**	J 3
182	**Belleview**	K 4
927	**Blountstown**	E 2
1,107	**Bonifay**	D 1
670	**Bowling Green**	L 7
3,305	**Bradentown**	K 8
411	**Branford**	J 3
1,385	**Brooksville**	K 5
950	**Carrabelle**	F 3
800	**Cedar Keys**	I 4
495	**Center Hill**	L 5
1,571	**Chipley**	D 1
400	**Citra**	K 4
1,932	**Clear Water**	J 7
807	**Cocoa**	N 6
389	**Coleman**	K 5
809	**Crescent City**	L 4
900	**Crystal River**	J 5
1,950	**Dade City**	K 6
512	**Dania**	F 7
4,526	**Daytona**	M 4
582	**Daytona Beach**	N 4
2.142	**De Funiak Springs**	C 1
3,490	**De Land**	M 4
304	**Deleon Springs**	M 4
429	**Dunedin**	J 7
979	**Dunnellon**	K 4
122	**Eatonville, Orange**	M 6
543	**Eau Gallie**	N 6
340	**Estero**	L 10
1,148	**Eustis**	L 5
279	**Federal Point**	M 3
3,114	**Fernandina**	L 1
488	**Floral City**	K 5
2,150	**Fort Meade**	L 7
3.244	**Fort Myers**	L 9
1,942	**Fort Pierce**	C 8
329	**Fort White**	J 3
6 737	**Gainesville**	K 3
286	**Goldsboro, Orange**	M 6
731	**Graceville**	E 1
2,287	**Green Cove Springs**	L 3
297	**Greensboro**	F 1
622	**Greenville**	H 2
131	**Gretna**	F 1
349	**Hampton**	K 3
558	**Hasting**	M 3
486	**Havana**	G 1
496	**Hawthorn**	K 3
592	**Hernando, Citrus**	K 5
1,265	**High Springs**	J 3
378	**Holly Hill**	M 4
350	**Interlachen, Putnam**	L 3
76,101	**Jacksonville**	L 2
1,631	**Jasper**	J 2
682	**Jennings**	I 1
21,724	**Key West**	C 10
4,221	**Kissimmee**	M 6
832	**Lake Butler**	K 3
3,422	**Lake City**	J 2
786	**Lake Helen**	M 5
7,287	**Lakeland**	L 6
324	**Lakewood**	C 1
552	**Largo**	J 7
300	**Laurel Hill**	B 1
532	**Lawtey**	K 2
1,360	**Leesburg**	L 5
3.294	**Live Oak**	I 2
368	**Macclenny**	K 2
1,763	**Madison**	I 2
145	**Maitland**	M 5
1,487	**Manatee**	K 8
2,357	**Marianna**	E 1
719	**Mayo**	I 3
500	**Mayport**	M 2
408	**Melbourne**	N 6
191	**Melrose**	L 3
15,592	**Miami**	F 7
617	**Micanopy**	K 4
1,415	**Milton**	B 1
295	**Montbrook, Levy**	J 4
2,040	**Monticello**	H 1
296	**Morriston**	J 4
576	**Mount Dora, Lake**	L 5
1,121	**Mulberry**	L 7
1,716	**New Augustine**	M 3
1,000	**Newberry**	J 3
2,012	**New Smyrna**	N 4
832	**Noma**	D 1
250	**Oakland, Orange**	M 6
5,370	**Ocala**	K 4
506	**Orange City**	M 5
341	**Orange Park**	L 2
6,448	**Orlando**	M 5
857	**Ormond**	M 4
1,000	**Pablo Beach**	M 2
4,622	**Palatka**	L 3
734	**Palatka Heights, Putnam**	L 3
1,625	**Palmetto**	K 8
2,013	**Panama City**	D 2
26,272	**Pensacola**	D 2
1,941	**Perry**	H 2
3,229	**Plant City**	K 6
438	**Pomona**	L 4
1,071	**Port Tampa City**	K 7
1,772	**Punta Gorda**	L 9
3,451	**Quincy**	G 2
191	**Reddick, Marion**	K 4
1,400	**St. Andrews**	D 2
5,471	**St. Augustine**	M 3
7,186	**St. Petersburg**	J 7
131	**San Antonio, Pasco**	K 6
4,998	**Sanford**	M 5
327	**San Mateo**	M 3
840	**Sarasota**	K 8
433	**Seabreeze**	N 4
571	**Sneads**	F 1
150	**Sopchoppy**	F 2
1,522	**South Jacksonville**	L 2
1,239	**Starke**	K 3
5,193	**Tallahassee**	G 2
53,886	**Tampa**	J 7
1,938	**Tarpon Springs**	J 6
449	**Tavares**	L 5
1,310	**Titusville**	N 5
550	**Trenton**	J 3
527	**Umatilla**	L 5
550	**Waldo**	K 3
1,839	**Wauchula**	L 8
307	**Webster**	K 5
294	**Welaka**	L 4
341	**Welborn**	J 2
4,090	**West Palm Beach**	O 9
269	**West Pompano**	O 10
11,968	**West Tampa, Sta. of Tampa, P. O.**	J 7
900	**White Springs**	J 2
385	**Wildwood**	L 5
800	**Williston**	J 4
648	**Winter Garden**	L 5
787	**Winter Park**	M 5
350	**Zolfo**	L 8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Milton
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De Funiak Springs
Bonifay
Vernon
Marianna
Blountstown
Bristol
Quincy
TALLAHASSEE
Crawfordville
Panama City
Apalachicola
Bainbridge
Cairo
SANTA ROSA ISLAND
Choctawhatchee Bay
St. Andrews Bay
CROOKED ISLAND
Point St. Joseph
St. Joseph's Bay
Cape San Blas (Light House)
ST. VINCENT I.
ST. GEORGES I.
DOG I.
Apalachee Bay
GULF OF MEXICO
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DADE
MONROE
Ft. Lauderdale
Miami
Everglade
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Fort Harrell
THOUSAND ISLANDS
Ponce de Leon Bay
Whitewater Bay
Cape Sable
MANGROVE SWAMP
Bay of Florida
Biscayne Bay
KEY LARGO
FLORIDA KEYS
DRY TORTUGAS
Key West
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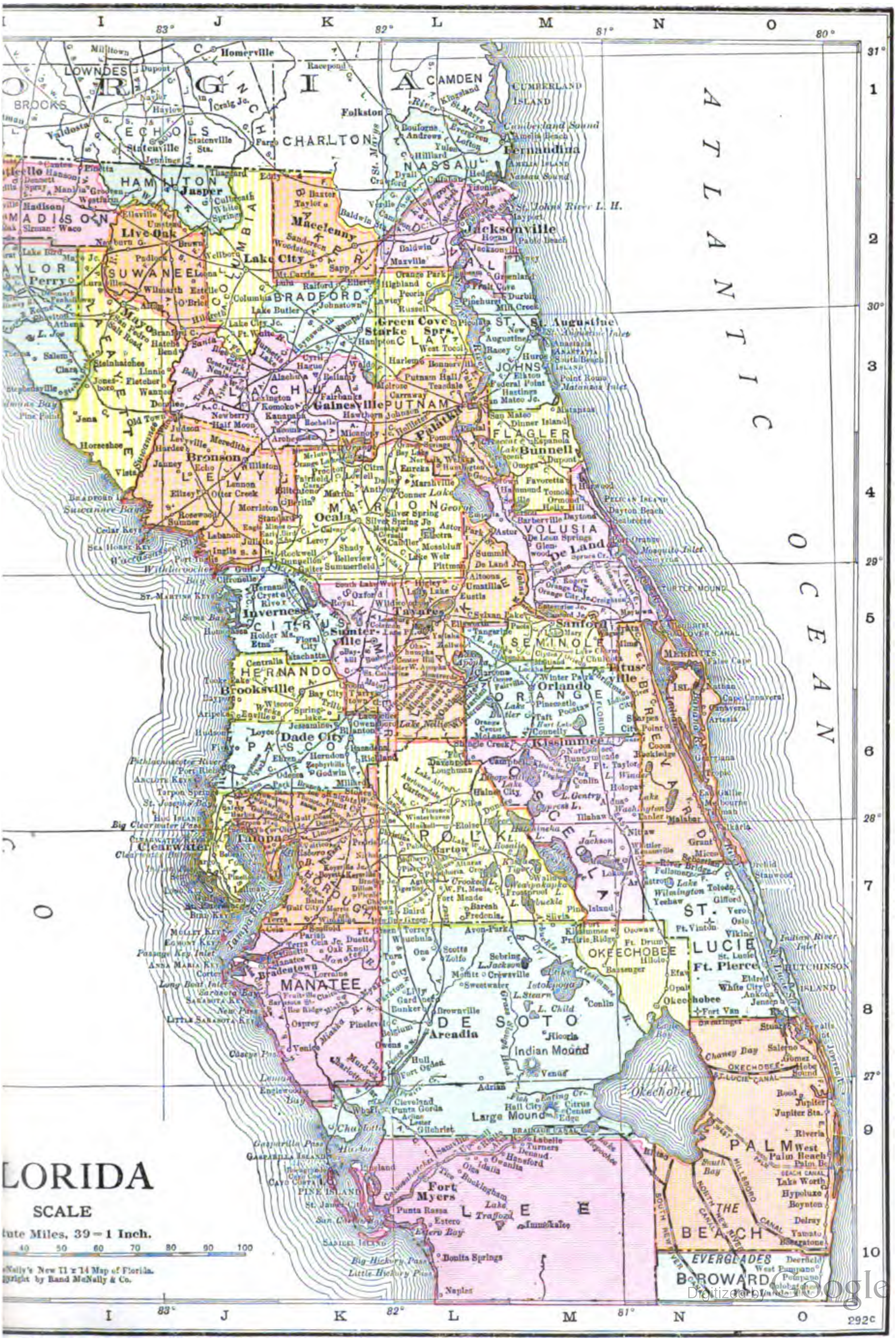
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G E O R G I A
LOWNDES
BROOKS
ECHOLS
CHARLTON
CAMDEN
Homerville
Valdosta
Statenville
Folkston
CUMBERLAND ISLAND
Cumberland Sound
ATLANTIC OCEAN
HAMILTON
Jasper
MADISON
Madison
TAYLOR
Perry
SUWANEE
Live Oak
COLUMBIA
Lake City
BAKER
Macclenny
NASSAU
Fernandina
DUVAL
Jacksonville
St. Johns River L. H.
BRADFORD
Starke
CLAY
Green Cove Sprs.
ST. JOHNS
St. Augustine
LAFAYETTE
Mayo
ALACHUA
Gainesville
PUTNAM
Palatka
FLAGLER
Bunnell
LEVY
Bronson
MARION
Ocala
VOLUSIA
De Land
Daytona
Suwannee Bay
Cedar Key
Withlacoochee Bay
CITRUS
Inverness
SUMTER
Sumterville
LAKE
Tavares
SEMINOLE
Sanford
ORANGE
Orlando
Titusville
HERNANDO
Brooksville
PASCO
Dade City
OSCEOLA
Kissimmee
BREVARD
MERRITTS ISL.
Cape Canaveral
Tampa
Clearwater
HILLSBOROUGH
POLK
Bartow
ST. LUCIE
Ft. Pierce
Indian River Inlet
OKEECHOBEE
MANATEE
Bradentown
DE SOTO
Arcadia
Indian Mound
Lake Okeechobee
PALM BEACH
West Palm Beach
Large Mound
Punta Gorda
Charlotte Harbor
LEE
Fort Myers
EVERGLADES
BROWARD
Naples
Bonita Springs
Gulf of Mexico
LORIDA
SCALE
tute Miles, 39 = 1 Inch.
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cNally's New 11 x 14 Map of Florida.
pyright by Rand McNally & Co.

in size and character and draining a similar country. It empties into the Atlantic below Jacksonville. Pleasure-steamers navigate it 250 miles, and the tributary swamp-rivers several hundred more. Its total course is 350 miles. The Kissimmee, flowing into Lake Okeechobee from Kissimmee Lake, is also a favorite with tourists and sportsmen. The leading streams of the west are the Suwanee; the great Apalachicola from Georgia, 90 miles long under that name, with a course of nearly 600 miles through the Chattahoochee; the Chocktawhatchee, 180 miles; and the Escambia, 250 miles with the Conecuh, from Alabama, the latter navigable to the Conecuh. Other important rivers are the Ocklawaha, Withlacoochee, Caloosahatchee, Chipola, Saint Mark's, Saint Mary's, and the Holmes, all of which are navigable for short distances from their mouths. The fall of all these streams is so slight that they furnish little or no water power. Attempts have been made in recent years to build dams to furnish power and have met with some success.

Soils.— The soils of Florida are mere surface deposits with no volcanic upheaval and all have sand as a common ingredient. Limestone is almost everywhere the underlying rock (see *Geology* above), but in the northeast siliceous sands have been brought down by the rivers and have been distributed by marine action. Three classes of soils may be distinguished: that of the pine lands which often contains a surface of dark vegetable mold or humus and is very productive; that of the «hammocks» which also contains dark mold mixed with marls and clays. It is met with in Alachua, Citrus, Levy, Hernando, Pasco, Leon, Gadsden, Jefferson, Jackson, and Madison counties; lastly that of the swamp lands and containing muck and peat soils and lying mostly in the east and southern parts of the State. These are the richest and most productive of all soils within the State, but they require adequate drainage systems to fit them for cultivation. Truck crops are now grown profitably on the sandy uplands, long deemed unfit for cultivation.

Climate.— Florida may be divided into three climatic zones. The continental portion of the State north and west of a line drawn through Cedar Keys, Gainsville, Starke and Jacksonville has a climate similar to that of the Gulf States and is warm-temperate in character. South of this line to the southern boundary of Hillsboro, Polk and Brevard counties the climate is semi-tropical, and the part of the peninsula south of this is sub-tropical in climate. The semi-tropical and sub-tropical zones have very uniform temperatures due in no small degree to the proximity of the Gulf Stream and to the trade winds which blow steadily across them. Indeed the climate of the entire State due to these factors is not subject to prolonged and severe winters with great ranges in temperature. The normal mean temperature for January ranges from 60° to 70° F., that for July being 80° and above. The hottest months are June, July and August, but even then the heat is tempered by frequent showers. West Indian hurricanes are infrequent but they are not unknown and at times have done great damage. In the south the growing season extends throughout the entire year, but frosts are not unknown and at times have brought disaster to the citrus and tropical fruit orchards. Key West is exempt from frost, however. In the northern counties there are a few days of frost in mid-winter and snow falls in some years but never in the south. The annual precipitation is from 58 to 60 inches, ranging from 6 to 8 inches in the fall and winter — the dry season — to 18 and 20 inches during the summer. Precipitation much greater than this has been recorded at different places at wide intervals, thus 85 inches of rain were recorded for Miami in 1908, but this is abnormal, and the general rainfall is as indicated above. Key West has the lowest precipitation, about 39 inches. The normal sunshine is about 60 per cent. Its warm climate, dry winters, and medicinal springs have combined to make Florida the Riviera of America. In its many resorts for health and pleasure it occupies a unique place among the States of the Union. The more important of these resorts are Saint Augustine, Ormond, Palm Beach, Miami, Tampa, Daytona, Hampton Springs, Orange Springs, White Springs, and Worthington Springs.

Fauna.— In general the fauna of the State is similar to that of the southern and eastern States. Buzzards, bear, deer, otter, wildcat (lynx), coons, possums, rabbits, squirrels are found. The puma, manatee (sea cow), alligator and crocodile were formerly present in great numbers but have decreased rapidly in recent years owing to the settlement of their native haunts by man and the increased efficiency of the modern hunter through the introduction of weapons of precision, like the breech-loading magazine rifle. Ducks and wild turkeys are still numerous in the more remote regions. Snakes are by no means as scarce as some venders of grape-fruit groves would have us believe, but probably Florida is no worse off in this respect than its neighboring States of the South. Of the larger birds pelicans and egrets were once plentiful, but the latter have been almost exterminated by hunters seeking their plumes. Sponges are cut in considerable quantities along the Gulf Coast.

Flora.— The northern or continental part of the State has a flora similar to other parts of southeastern North America, while that of the south is affiliated with the flora of South America and the West Indies, and appears to form a connecting link between the latter and the flora of North America. About four-fifths of the species of southern Florida are common to the West Indies, Mexico, and South America. The forests are estimated at 27,000,000 acres, two-thirds the area of the State; largely consisting of live-oak, hickory, long-leaved pine, pitch-pine, and cypress. Yellow pine is also plentiful. Florida has about half of the varieties of forest trees found in the United States, comprising 202 species and including 281 native and cultivated trees. Peculiar to the State are the «Florida mahogany» or red bay, cachibou, satinwood, kino-gum, manchineel, Indian almond, wild orange, coconut, yew and savin. Gum trees, magnolia, several species of palmetto, and red maple are common also. Whole districts in the State are covered with a dense undergrowth of shrubs, with little or no grass beneath. The spruce pine covers large areas together with several kinds of evergreen shrubs. «Florida scrub" is the popular name for this dense type of vegetation.

Forest Products.— The lumber and timber product of Florida, with the tar, turpentine, and ship stores, amount to about $40,000,000 yearly, or 75 per cent more than all the rest of the State's manufactures together. The private timber holdings in the State exceed 17,000,000 acres and the stand of timber is estimated at 74 billion feet, board measure. This stand is made up of 80 per cent of pine, 15 per cent of cypress, and the remainder of hardwoods. In a recent year the 490 saw mills of the State turned out over 1,000,000,000 feet of pine lumber, laths, etc.; 85,000,000 feet of cypress; 1,300,000 feet of hickory; about the same quantity of oak, yellow poplar, and cedar; and lesser quantities of ash, cottonwood, red gum, elm, tupelo gum, etc. This was all dressed lumber, exclusive of poles, railway ties, staves, etc., and was valued at $17,000,000.

The production of turpentine has greatly increased in the last decade, about 20,000,000 gallons being now produced annually at a value of about $14,000,000. Rosin is produced at the rate of over 2,000,000 barrels annually, and brings over $5 per barrel. Tar is also produced in ever-increasing quantities. Since the entry of the United States into the World War, and owing to the unprecedented demand for ships, both of wood and steel, the quantities of turpentine, tar, rosin, and ship stores produced in Florida have been greatly increased as has also the timber cut.

Fish and Fisheries.— Florida's enormous coast-line in the mid-continental seas gives its fisheries the greatest extent and value of any State south of Virginia; they employ over 9,000 men. The total number of species of fish in the coastal waters of Florida is estimated at 500, and many species found off the Atlantic are not found off the Gulf coast and vice versa. The tarpon and the kingfish afford splendid sport to fishermen, while shad, mullet, red-snappers, trout, pompano, sheepshead and Spanish mackerel are taken for their economic value. Pensacola is the most important fresh fish market on the Gulf. About 350 vessels are engaged in the fishing industry, the catch is over $3,500,000 a year; it is usually packed in ice and shipped to the populous centres of the North. The sponge fishery is peculiar to Florida, and centres in Key West; it has produced as much as $550,000 a year. Alligators are caught for their skins, but their number is fast diminishing.

Minerals and Mining.— Florida has no metals, and its mineral industries are of rock and earths. The chief is the mining of phosphate rock for fertilizers, in which it rivals any other district of the world. It is in various forms — hard and soft rock, land and river pebble, and vertebrate remains. The hard rock — much the most valuable, containing 80 per cent phosphate of lime — is found in a belt skirting the Gulf from Tallahassee nearly to Tampa. The centre of the industry is Dunnellon, Marion County, and pebble phosphate is found in Hillsborough, De Soto, Citrus, Osceola and Hernando counties. Phosphate was discovered in 1888, and since then the product has risen to important proportions. The pebble phosphate was long unpopular, but improved methods of treatment now make it as desirable as the hard rock phosphate, which for many years was the only kind that figured in the exports. In 1915, 1,358,611 long tons, valued at $3,762,209 were produced. Production that year was at a low ebb, the industry being in poor condition because of the war. Shortly after the outbreak of hostilities production was curtailed by many companies and some suspended operations altogether. The year 1916 witnessed a gradual improvement in this industry, still the production in that year was only about 65 per cent of that of 1913, the last normal year before the war. The 1916 figures are 1,515,845 long tons, valued at $4,170,165. Florida in that year produced 76 per cent of the total of phosphate rock in the United States.

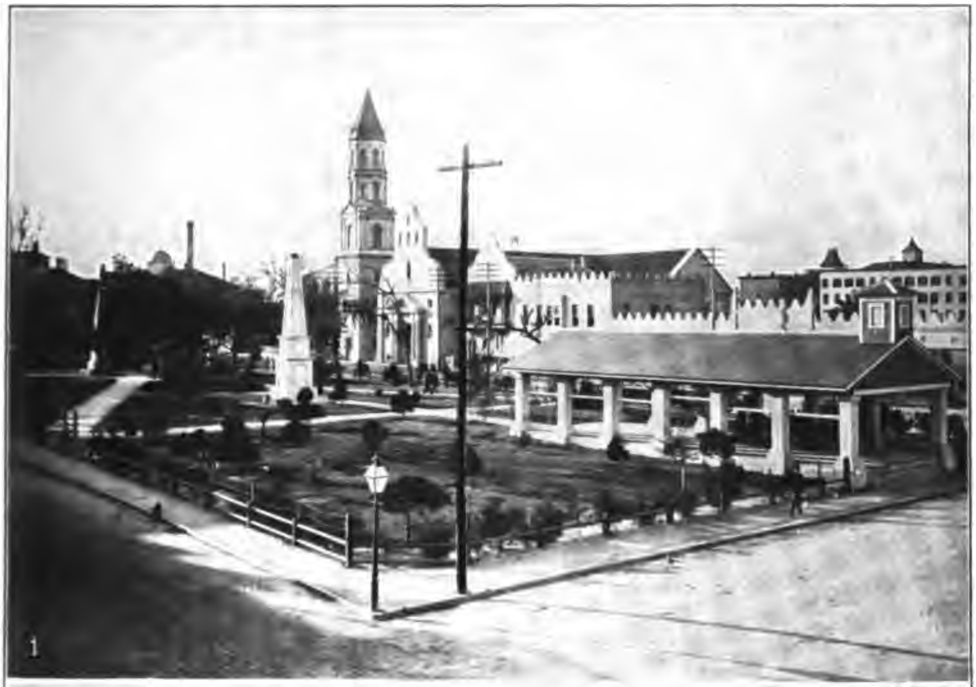
Most of the fuller's earth used in the United States is also from Florida. There are extensive deposits at Ellenton, on the Manatee River and at Quincy. The demand for this substance in the refining of animal, vegetable and mineral oils has led to a vastly increased production within the last 20 years. The value of the yearly output in Florida is about $300,000. Kaolin is produced to the value of about $50,000 annually. Florida ball clay is in great demand by potters because of its high plastic qualities. The output of the brickyards is valued at $300,000 yearly.

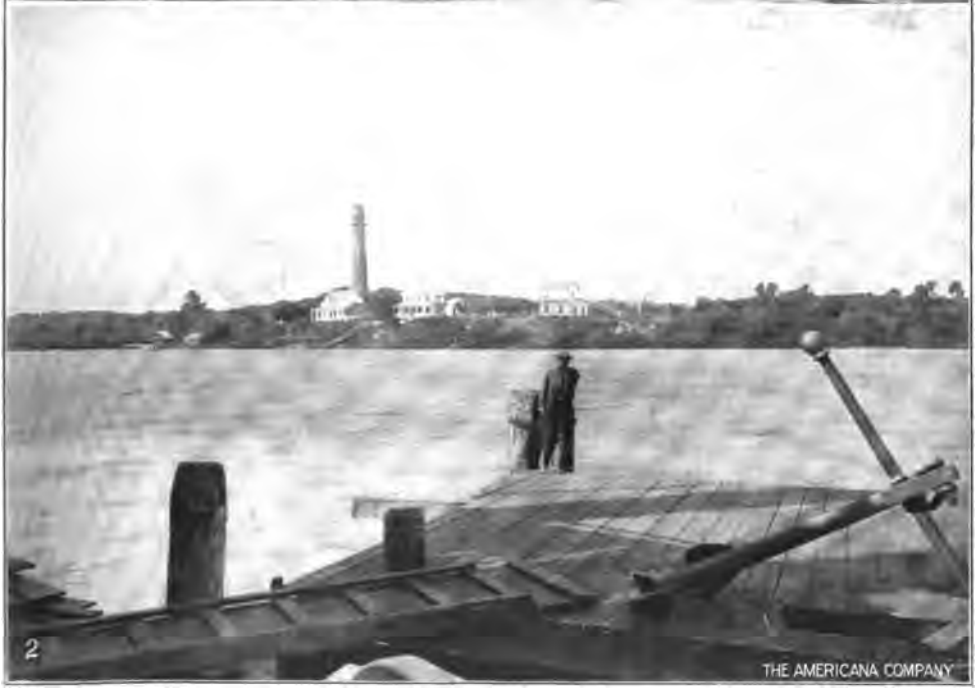
Lime and mineral waters are also produced. The whole mineral output in 1914 was valued at $8,497,688, and in 1915 at $4,886,010. In normal years its value is well above $10,000,000.

Agriculture.— The soil, while much of it seems a sterile sand, is helped to fertility by the moisture. Florida furnishes abundantly the rich fruits and valuable products of the tropics. Large areas are devoted to orange orchards, while lemons, limes, grapes, pineapples, bananas, pears, guavas, etc., grow with equal luxuriance and coffee, rice, cotton and tobacco are natural products. Sea-Island cotton, so valuable and elsewhere limited to a few islands, here grows far inland. Coconuts also are grown in the sub-tropical region. Horticulture is one of the most profitable pursuits, and of late years market-gardening has assumed considerable dimensions in many parts of the State. An abundance of fruits and vegetables may be had fresh every month in the year, and during the winter and early spring months they are in great demand in northern markets. Agriculture is pursued generally in all parts of the State. At the last census there were 50,016 farms, with a total acreage of 5,253,538, of which 1,805,408 acres were improved. The total value of all farm property was placed at $143,183,183. About three-fourths of the farms are cultivated by their owners, but the tenantry system has increased within the last two decades, and is especially common in the districts where cotton is the principal crop. About one-third of the farms are operated by negroes, but one-half of the negro farms are rented and the value of farm property held by negroes is $18,000,000 or about one-eighth the value of the farm holdings of the whole State.

In 1916, 840,000 acres were planted with corn; the product was 12,600,000 bushels valued

FLORIDA



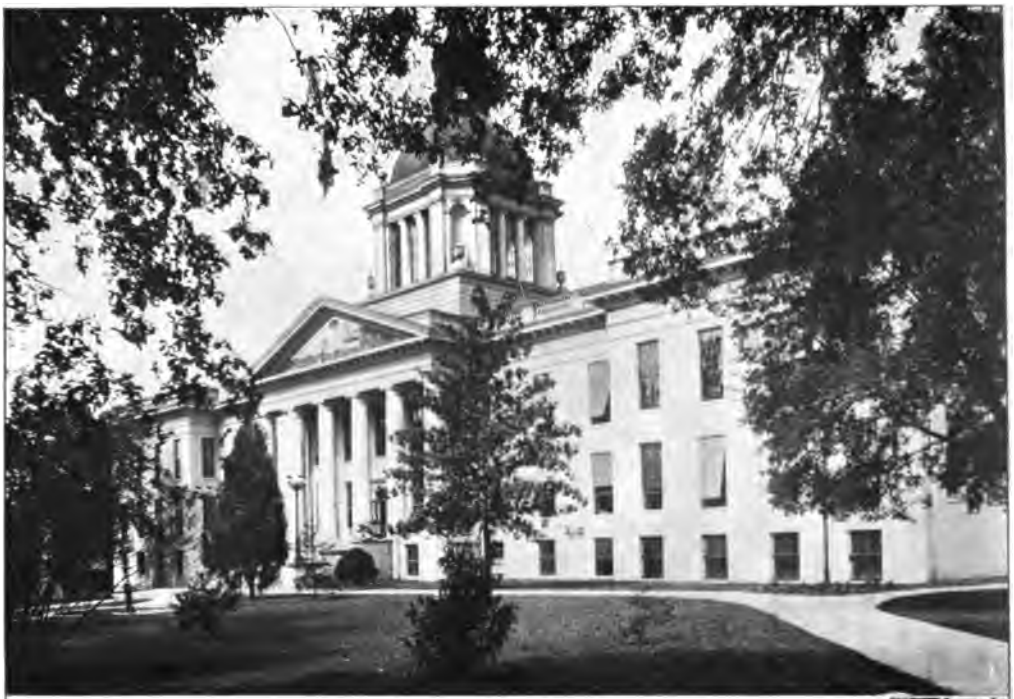


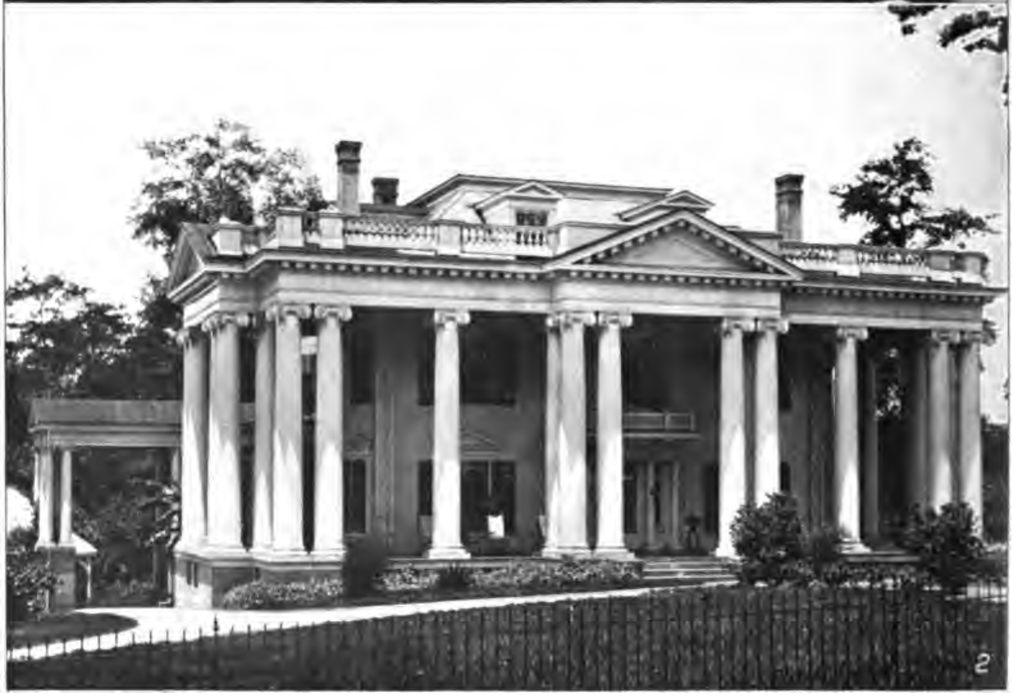
THE AMERICANA COMPANY

1 The Plaza, St. Augustine

2 Jupiter Light

FLORIDA





1 Capitol   2 Governor's Mansion

at $11,340,000. In the same year cotton was grown on 197,000 acres and the product was valued at $6,412,000. Tobacco was planted on 2,500 acres to the extent of 3,025,000 pounds and sold for $908,000. In the same year 1,110,000 bushels of potatoes, valued at $2,220,000 were grown on 15,000 acres. Hay was produced on 56,000 acres to the extent of 70,000 tons, valued at $1,120,000. Oats to the extent of 900,000 bushels was grown on 60,000 acres and sold for $639,000. In the same year 18,000 bushels of rice, valued at $14,000, was raised from 700 acres. In 1917, 3,410,000 pounds of tobacco were produced and 21,000 bushels of rice. Peanuts are grown on about 100,000 acres and the value of the annual crop is well over $2,000,000. In 1917 the cotton area was 183,000 acres and the yield 40,000 bales. The cotton area is confined almost entirely to the northern part of the State. Gadsden County is the centre of the tobacco growing district and about four-fifths of the State's crop is produced within its borders. Sugar-cane is being planted to an ever increasing acreage; about 150,000 tons of cane are now grown annually. The value of the 1917 potato crop was $4,664,000, from 25,000 acres. Other vegetables in the same year were produced to the value of over $8,000,000.

Horticulture.— The orchard crops are rich in tropical products — lemons, limes, guavas, Japanese plums, olives, figs, coconuts, etc.; but the leading crops are oranges, grape-fruit and pineapples. The orange industry has been subject to immense vicissitudes. Early in the 90s it was the one speculation of central Florida, and the product rose to 5,000,000 boxes in one year; then the terrible cold wave of 1894–95 froze millions of young trees to the roots, often splitting them in two. The older trees, where well handled, generally survived, but another cold wave in 1899 — giving native Floridans the unprecedented sight of several inches of snow — destroyed a large part of those also; the two disasters killed three-fourths of all the orange trees in the State. The crop sank to 125,000 boxes or thereabouts, and most of the growers abandoned the business, thinking a permanent change of climate had set in; but it is now known that heavy frosts occurred now and again in earlier times as well, and growers are recovering courage, though the industry is shifting toward the southeast coast. The orange crop in a recent year amounted to 4,769,312 crates, valued at $5,665,415. The industry is now well established in Brevard, Orange, Volusia, Hillsborough, Lake, De Soto, Putnam and Polk counties. The grape-fruit industry has extended rapidly within the last decade particularly in Dade, Lake, Lee, Manatee, Orange, Brevard, Palm Beach and Pinellas counties. In a recent year 1,405,308 crates, valued at $2,684,525, were produced. Saint Lucie County is the centre of the pineapple district, but great quantities are produced also in Dade, Lee and Palm Beach counties. In a recent year 355,658 crates of pineapples were produced, valued at $383,155, also 11,810 crates of lemons, valued at $32,763; 27,061 bunches of bananas, valued at $26,346; 19,373 crates of avocado pears, valued at $53,730; 26,500 crates of mangoes, valued at $26,500; persimmons valued at $6,650; 56,170 crates of guavas, valued at $49,000; 16,500 crates of figs, valued at $25,580; peaches valued at $225,576; 30,900 barrels of pears, valued at $78,250; 17,700 bushels of plums, valued at $23,000; 1,000,000 pounds of grapes, valued at $74,000, and coconuts to the value of $8,400.

Of tropical fruit trees there are over 40,000,000 of bearing age. The annual value of the tropical fruit crop is now well over $10,000,000. Strawberries are grown in large quantities for the northern markets; the annual value of the crop is about $350,000.

Live Stock.— On 1 Jan. 1918 the State had 62,000 horses, valued at $6,100,000; 33,000 mules, valued at $4,950,000; 120,000 sheep, valued at $300,000; 1,375,000 pigs, valued at $12,375,000; 145,000 milch cows, valued at $6,184,000, and 891,000 cattle other than milch cows, valued at $16,038,000. The total value of all farm animals in the State on 1 Jan. 1918 was $45,947,000, an increase of 126 per cent over the value of the live stock in 1910, which was $19,818,905, and an increase of 47.7 per cent over the value of the live stock on 1 Jan. 1914, which was then estimated by the United States Department of Agriculture at $31,828,000.

Manufactures.— The greatest industry of Florida, aside from the forest products, is the manufacture of cigars and tobacco, of which the heart is Tampa and Key West; it was developed by the immigration of Cuban cigar-makers and still use great quantities of Havana leaf. The total value of tobacco products manufactured annually is $21,575,000; the industry gives employment to 12,280 wage earners in 229 establishments. The capital invested in the industry amounts to $11,164,000, and the operatives receive as wages $7,169,000 yearly. Of the total value ($21,575,000) of the products of this industry, $12,890,000 is the value added by manufacture. The lumber and timber industry with the by-products of tar, rosin, turpentine and naval stores is the greatest industry at present in the value of the product which is estimated at $40,000,000 yearly. These industries employ over 37,000 people, but in the turpentine and ship stores industry convict labor was employed to a very great extent until 1915. In these industries the greater part — nearly two-thirds — of the value of the product is added by manufacture. Next in importance comes the fertilizer industry which, with an invested capital of $3,758,000 employs nearly 1,000 people in 12 establishments. The value of the products in a recent year was $4,170,165, of which about one-third represented the value added by manufacture. The next industry of great proportion is that of cars and general shop construction and railway repair shops. There are 12 establishments of this kind in the State, with 1,753 wage-earners, who receive $1,018,000 in wages annually. The invested capital amounts to $1,251,000 and the value of the output to $1,743,000, of which $1,142,000 represents the value added by manufacture. The printing and publishing industry is next in importance with 174 establishments employing about 1,000 wage-earners, and paying yearly $529,000 in wages.

The capital invested in this industry amounts to $1,683,000; the value of the product is estimated at $1,866,000, of which $1,432,000 is added by manufacture. Other industries with annual products less than $1,000,000 in value are those of wooden boxes and barrels, cedar for lead pencils, sugarcane syrup, cottonseed oil and meal, brick and tile, canning and preserving, foundry and machine shop products, gas and ice, and boat building. The United States census of manufactures for 1914 showed within the State 2,518 industrial establishments of factory grade, employing 63,296 persons, of whom 55,698 were wage-earners receiving annually a total of $24,822,000 in wages. The capital invested aggregated $88,319,000, and the year's output was valued at $81,112,000; of this $47,296,000 was the value added by manufacture; the materials used having cost $33,816,000.

The industrial progress in Florida was slow until the Civil War and afterward until the end of the Reconstruction period. It has made rapid strides, however, in the present century, but it suffers from several natural handicaps which preclude Florida from ever becoming of prime importance as an industrial State. The chief drawbacks are the lack of coal and of water power, two necessary requirements for any great industrial State. Another handicap is the system of leasing convict labor, a feature common to many States of the South. Great industries do not thrive on such a system and the sooner legislation is adopted to bring about its abolishment the sooner will industry show a healthful activity in all lines. As stated above the State's industries give employment to 55,698 wage-earners, who receive compensation for their services to the amount of $24,822,000 yearly, an average of $446.39 per person. The same authority (United States census of manufactures) gives the capital invested as $88,319,000, 6 per cent interest on which would amount to $5,229,140. The value added to the raw materials by manufacture was $47,296,000. By deducting from this the amount of wages and the interest on the capital — $30,051,140 — we have $17,244,860 left for depreciation of plant, machinery, etc., and as compensation for the 8,000 other persons engaged in industry and not classed as wage-earners. This reward for the masters of industry appears unduly high in comparison with the $446.39 per annum paid to the average wage-earner. Of the wage-earners in industry in Florida only 3,000 are women and less than 1,000 are under 16 years of age. The average hours of labor are 58 hours per week and in about one-sixth of all establishments the hours were more than 60 per week. Tampa, Key West, Jacksonville and Pensacola are the chief industrial centres and contain nearly one-half of all industrial establishments in the State. Tampa and Key West lead with tobacco establishments, Jacksonville in fertilizer works, while at Pensacola all industries are about equally represented.

Commerce and Transportation.— Florida's position makes it the natural outlet for exports to the West Indies; but till late years unimproved harbors and inferior railroad equipment checked the volume of commerce. The export trade of the State amounts to about $30,000,000 annually, with about $4,000,000 imports. About 3,000,000 tons of shipping clear yearly from Florida ports. The tar, resin and turpentine exported from Pensacola are valued at over $2,500,000 annually, and cotton to the value of $9,030,000 is exported from this port, but some of this comes from Alabama and Georgia, as also some of the tobacco and phosphate exported from here. The State's chief exports are timber and lumber (over $19,000,000 annually), naval stores, fruits, corn, cotton, tobacco and cigars, phosphate rock and fertilizer, fish, and horses, mules and cattle to Cuba. The largest exporting points are Pensacola, Tampa, Jacksonville and Key West. There are important steamer lines running from Jacksonville to Charleston, New York and Boston; from Tampa to Havana and Porto Rico; from Key West to Havana, Galveston, New Orleans and New York, and from Miami to Nassau and Cuba, also coasting lines from Fernandina, Apalachicola, Carrabelle and Punta Gorda.

Great improvements have been made in the principal harbors in recent years. The harbor channel of Pensacola is now 30 feet deep at low water and 500 feet in width. At Jacksonville harbor improvements are being carried out, which when completed will insure a channel 30 feet in depth and about 300 feet wide from the inner harbor to the ocean. There is much tourist traffic and business navigation on the rivers and bays. The Saint John's has been greatly improved as also the channel of the Apalachicola.

Of prime importance in the development of the State have been the railways. In 1880 the State had only 518 miles of railway, in 1917 it had 6,060 miles, of which 5,040 were single track and 3,833 were main track. The mileage of electric roads in the same year was 128. The largest railway system is the Atlantic Coast Line with 947 miles of main track lines. The Seaboard Air Line is next in importance with 928 miles, followed by the Florida East Coast, 522 miles; the Louisville & Nashville, 216 miles; the Georgia Southern & Florida, 152 miles, and the Apalachicola Northern, 102. The Florida East Coast Railway extension to Key West was opened 22 Jan. 1912. This extension was a remarkable engineering feat, linking up the Keys for about 100 miles. The construction comprised numerous concrete viaducts over channels and embankments across the Keys. Railroad rates are regulated by a State railroad commission, which may fix any rate it deems equitable provided that the revenue from such rates does not sink below the sum required to meet operating expenses and general maintenance charges.

Banks, Finance, etc.— There are 46 national banks in the State, with a paid capital in excess of $6,000,000, and total deposits amounting to $29,000,000. The 143 State banks have deposits aggregating $23,000,000, of which about $6,000,000 are classed as savings deposits. The four savings banks in the State had 7,197 depositors in 1916, with $1,759,612 placed to their credit, being $244.49 to each depositor. There are seven private banks in operation and five loan and trust companies with deposits aggregating $732,127.

The assessed value of real property for 1917 was $214,771,689; for personal property, $107,444,383, making a total for that year of $322,216,072. In the same year the financial status of the State Treasury was as follows:

Balance on hand, 1 Jan. 1917	$1,077,710
Received from all sources in 1917	4,922,028
Total	$5,999,738
Disbursed during 1917	4,935,929
Balance in Treasury, 1 Jan. 1918	$1,063,809

The public debt of the State, 1 Jan. 1918, consisted of refunding bonds to the amount of $601,567 at 3 per cent interest, all of which were held by State educational funds. Under recent legislation special tax districts are provided which are empowered to issue bonds for the construction of free public schools.

Education.— It was not until 1835 that a public school system was provided for by public funds. In the census of 1840, 18 academies were reported and 51 public schools. In 1849 a State appropriation provided in a manner for the education of white children and the Federal government in the same year made a grant of land for the same purpose. In 1860, the State reported 2,032 pupils in public schools and 4,486 in academies and other schools. The Civil War wrought havoc with the growing educational system and it was not until 1869 that the work was well in hand again. The problem in Florida, as elsewhere in the South, is made very difficult by the scattered rural population and by the great number of negroes. The State constitution prescribes that white and colored children shall not be taught in the same school, but impartial provision shall be made for both. The percentage of illiteracy in 1910, was 13.8, a decline from 21.9 per cent in the previous decade. The percentage of illiterates among negroes was 25.5 per cent. In 1916, there were in operation 2,916 public elementary schools, with 198,365 enrolled pupils. There were in the same year 4,380 female teachers and 1,485 men teachers. In 103 public high schools there were 176 men and 211 women teachers and 6,339 pupils. The total expenditure on education in that year was $3,818,675. Higher education is provided in a University of the State of Florida, at Gainesville; a State College for Women at Tallahassee, with 550 students; Rollins College at Winter Park, with 175 students. There is also the John B. Stetson (Baptist) University at De Land, founded in 1887, and now having an enrollment of 462 students. There is a colored normal and industrial school at Tallahassee. Colored secondary education is provided for by three institutions at Jacksonville and one at Live Oak.

White male teachers receive an average monthly salary of $55; white females, $37; negro male teachers, $39; and negro female teachers, $31. Florida has a local option compulsory school attendance law, passed by the last legislature. Duval County has compulsory school attendance.

Religion.— The Baptists are the strongest religious denomination, including about 41.6 per cent of all church members in the State. The Methodists are a close second with 37.2 of the total membership. The remainder is made up of Roman Catholics, numbering 51,000, Protestant Episcopalians and Presbyterians.

Charities and Penal Institutions.— There is a State Hospital for the Insane at Chattahoochee, a school for the blind and for deaf-mutes at Saint Augustine, a State Industrial School for Boys at Marianna, a Confederate Soldiers' and Sailors' Home at Jacksonville, an Industrial School for Girls, and the State Prison Farms at Raiford and Ocala. Juvenile courts are administered by the regular county court judges but separate juvenile records are kept. According to the last census statistics there were 207 paupers in almshouses, being 27.5 per 100,000 of the popoulation. Indigent mothers are pensioned by the State.

There is no penitentiary in Florida, the convicts are leased under contract for their labor as in other States of the South. Previous to 1913 they were hired out to the highest bidder who also undertook to lease all other persons committed during the term of his lease. It was usual for this party to sub-lease the prisoners. A supervisor of convicts was appointed in 1889 and additional supervisors might be appointed at the will of the governor under a statute passed in 1905. Special legislation was enacted from time to time to curb the abuses inherent to the leasing system. Over $200,000 was realized many years by the State under the system, which until 1906 included female as well as male prisoners, and the decrepit as well as the able-bodied. In that year provision was made for excluding all feeble prisoners upon examination by the State prison physician. Females continued to be leased until 1913. The law passed in that year ordered the Board of Commissioners of State Institutions to allot able-bodied male convicts for work on the public roads to such counties as might apply for them. For each convict so allotted $120 was assessed against the county. Under this provision only 50 convicts were placed at road work in the counties; the other able-bodied convicts were leased to the highest bidders throughout the State for a term of two years. All these were employed in the turpentine industry. The decrepit prisoners were placed on the State farms at Ocala and Raiford, where all able to do manual labor, were put at farm work, building, etc. County probation officers were appointed under the act of 1913. All prison camps are under the supervision of the governor and the supervisors appointed by him. Each camp is inspected at intervals not exceeding 30 days. According to the last census there were in the State 1,836 prisoners, being 243.9 per 100,000 of the population. In 1915 this number was reduced to 1,082.

Government.— The State constitution now in being was framed in convention in 1885, was ratified by the people at the November elections of 1886, and went into effect on the first of January of the following year. Minor amendments have since been made. Compared with the earlier constitution of 1868, it made many sweeping changes in the direction of democracy. The State and county officers had formerly been mostly appointed by the governor, and the Supreme Court justices were appointed for life; under the present constitution all are elected, except circuit judges, and the judges' terms are six years. An amendment to the constitution may originate in either branch of the legislature in the course of a regular session. If such amendment receive the votes of three-fifths of the members of both houses, it is submitted to the people for ratification at the next general election following. A two-thirds vote of the members of both houses of the legislature is required to submit a revision of the constitution to the people. If ratified by a majority of the latter, a constitutional convention is then provided for by the legislature, to meet within six months after the law providing therefor and to be composed of delegates equal in number to the membership of the Lower House, and appointed among the counties similarly to the members of the Lower House.

Executive.— The highest executive power is vested in the governor, who is elected for four years, and cannot be re-elected for an immediately succeeding term. His salary is $6,000. His veto may be overridden by a two-thirds vote of the members present in both branches of the legislature. In case of vacancy, the succession devolves on the president of the senate and the speaker of the house successively. Other officers wielding executive power are the secretary of state, the attorney-general, the comptroller, the treasurer, the superintendent of public instruction and the commissioner of agriculture. All these officials are elected the same year as the governor and for a like term of four years. With the governor they form the Board of Commissioners of State Institutions. The Board of Pardons is constituted of the same State officers, except the superintendent of public instruction.

Legislative.— The legislative power resides in a State legislature, composed of two chambers, a senate of 32 members and a house of representatives of 68 members. The legislature meets biennially, with sessions limited to 60 days except at their own expense. Extra sessions may be convened by the governor by proclamation, but such extra sessions are not to exceed 20 days. Senators are elected for four years. Representatives are elected for two, the senate being renewed by one-half every two years. The regular sessions begin on the Tuesday following the first Monday in April in alternate years. The legislature meets in 1919.

The Judiciary.— This branch of the State government is composed of a supreme court, circuit courts, criminal courts, county courts and local justices of the peace. The five justices of the supreme court serve for six years; they are elected under the new constitution but previous to 1885 were appointed for life. The chief justice is selected every other year by lot. A majority constitutes a quorum. The 15 justices of the circuit courts also serve for six years. They are nominated by the governor but before qualifying must be confirmed by the senate. In the circuit courts all cases in equity are tried and these courts have exclusive original jurisdiction in such cases. They are also the final courts of appeal in civil and criminal cases first tried in the county courts. State's attorneys are appointed to the circuit courts and serve for terms of four years. The minor courts, criminal courts of record, county courts, county judges' courts, and justices of the peace, are all of limited jurisdiction. Twelve men are required on a jury in all capital offenses, but in all other criminal and in all civil cases six men only are required.

Suffrage, etc.— The constitutional qualifications for an elector are that he be a male citizen of at least 21 years of age. If a naturalized citizen naturalization certificates must be presented at the place of registration. The prospective voter must also have resided in the State one year and in the county six months next preceding election and must register. In addition to these requirements the payment of a poll tax for the two years preceding election has been added as a qualification for voting by act of the legislature, such enactment having been authorized by the constitution. For persons who have been residents of the State for only one year this provision is modified accordingly, requiring payment of the poll tax for one year only. The State has the pure Australian ballot and in order to control the negro vote non-partisan tickets are usually put forward. General elections take place biennially on the Tuesday next following the first Monday in November in even years. In accordance with the provisions of the 17th amendment to the Federal Constitution, United States senators are elected by the people at the general elections which precede the expiration of a senatorial term of office. In case of a vacancy the governor is empowered to make a temporary appointment until such vacancy is filled at a general election.

In 1913 a primary election law was passed by the legislature which contained provisions for the nomination to all elective offices in the State, regulated campaign expenditures, and instituted severe penalties for corrupt practices. Under this law to secure representation as a party on the ballot a political party must have polled at the preceding election at least 5 per cent of the vote of the entire State.

Local Government.— The county is the political unit, and at its head is a board of five commissioners which exercises general jurisdiction over county affairs. These commissioners are elected for a term of two years. Other county officers are the sheriff, the treasurer, tax assessor, tax collector, surveyor, superintendent of public instruction, clerk of the circuit court and constables. It is within the province of the legislature to define the powers and jurisdiction of municipalities and these are generally set forth in the charters establishing such municipalities. All towns may adopt the commission form of government. Pensacola and Tampa are the largest cities which have done so.

Special Constitutional Provisions.—A wife holds in her own name property acquired before or after marriage; she is not liable for debts incurred by her husband. Intermarriage of whites and negroes, or persons of negro descent to the fourth generation, is prohibited. A homestead of 160 acres, or of one-half of an acre in an incorporated town or city, owned by the head of a family who is a resident of the State, with personal property not to exceed $1,000 and the improvements on the real estate is exempt from enforced sale except for purchase money, delinquent taxes, or mortgage. It is further ordered by legislative enactment that whites and blacks living in adultery are to be punished by imprisonment or fine; divorces may be secured only after two years' residence within the State and on the ground of adultery, extreme cruelty, habitual drunkenness, habitual indulgence in violent temper, desertion for one year, previous marriage still binding, physical incapacity, or such relationship of the parties as prohibits by law their entering into lawful wedlock. Legitimacy of natural children can be established by subsequent marriage of the parents. The legal age of consent is 16 years.

AMERICAN GOVERNORS OF FLORIDA.

TERRITORIAL

Andrew Jackson	1821–22
William P. Duval	1822–34
John H. Eaton	1834–36
Richard K. Call	1836–40
Robert R. Reid	1840–41
Richard K. Call	1841–44
John Branch	1844–45

STATE

William D. Moseley	Democrat	1845–49
Thomas Brown	Whig	1849–53
James E. Broome	Democrat	1853–57
Madison S. Perry	"	1857–61
John Milton	"	1861–65
William Marvin	Provisional	1865–
David Shelby Walker	Democrat	1866–68
Harrison Reed	Republican	1868–72
Ossian B. Hart	"	1873–74
Marcellus L. Stearns	"	1874–77
George F. Drew	Democrat	1877–81
William D. Bloxham	"	1881–85
Edward A. Perry	"	1885–89
Francis P. Fleming	"	1889–93
Henry L. Mitchell	"	1893–97
William D. Bloxham	"	1897–1901
William S. Jennings	"	1901–05
Napoleon B. Broward	"	1905–09
Albert W. Gilchrist	"	1909–13
Park Trammel	"	1913–17
Sidney J. Catts	"	1917–21

Population.— In 1900, Florida had a population of 528,542, comprising 297,812 whites and 320,730 negroes. or 9.6 persons to each square mile of area. In 1910, it returned 752,619, comprising 443,950 whites and 308,669 negroes, or 13.7 persons to the square mile. This was an increase of 42.1 per cent for the decade. In 1915, the population by sex and birth comprised 291,684 white males, 268,103 white females, 187,295 negro males, and 173,099 negro females, 226 Asiatics and 129 Indians, making a grand total of 921,618. Of the total (752,619) reported by the last census, 33,842 were foreign born, of whom 1,896 were from the West Indies, 2,917 from England, 2,442 from Germany, 4,538 from Italy, 1,698 from Canada, and 4,183 from Spain. The population on 1 July 1917, was estimated at 916,185. The largest cities in the State are Jacksonville, with an estimated population of 76,101 in 1916; Tampa, 53,886; Pensacola, 26272; Key West, 21,724; Tallahassee, the capital, 5,193. Of the total population, in 1915, 44.2 per cent was urban.

Indians.— The greatest and the most heroic stand of the American aborigine in defense of his home land was made by the Seminoles of Florida, who for centuries after the advent of the white man roamed in undisputed possession all over the peninsula. The Spaniards attempted to found only a few settlements on the coast and rarely penetrated inland; during the later colonial period they treated the Indians with kindness and interfered not at all with their freedom of action. Soon after the peninsula was ceded to the United States, grasping white settlers from Georgia began to encroach on the red man's domain and exhibited little sympathy, no charity and a minimum of honest dealing toward him. Trouble ensued and one of the great conflicts of American history took place in which superior force prevailed, the Indians were decimated, and the greater part of the survivors were torn from their native haunts and removed to western reservations. Some, however, concealed themselves in the Everglades, refused to yield and to-day their descendants occupy a unique position. They are still unconquered and have never acknowledged allegiance to the government of the United States. Their number is estimated at present as a little less than 500 souls. They are expert hunters and trappers as their forebears were, but the drainage enterprises and the ever advancing settlements of the whites are rapidly depriving them of their hunting grounds and consequently of their means of subsistence, for they do not take kindly to agriculture.

Since 1889 the State legislature made several attempts to set aside land for the Indians. Congress took a hand in the matter and provided funds for the purchase of 23,000 acres for a reservation. In 1913, Congress appointed a special agent to look after the interests of this tribe. In 1917, the State legislature set aside 100,000 acres near the Ten Thousand Islands, on which industrial schools are to be erected and where the Seminoles will be assisted to become self-supporting through agriculture, stock-raising, etc. The difficulty to be faced is that most of the tribe still look upon agriculture with disdain and their peculiar tribal customs render efforts for their education especially difficult. The measles, elsewhere a mild disease, is one of the great enemies of the Seminoles. Because of the lack of sanitation, it spreads rapidly, and the medicine man of the tribe often proves an efficient aide in increasing mortality from the disease. For the ethnography, history, customs, etc., of this tribe see SEMINOLE INDIANS.

Counties and County-Seats.— The State has 54 counties, which, with their capitals, are as follows:

Alachua, Gainesville
Baker, MacClenny
Bay, Panama City
Bradford, Starke
Brevard, Titusville
Broward, Fort Lauderdale
Calhoun, Blountstown
Citrus, Inverness
Clay, Greencove Springs
Columbia, Lake City
Dade, Miami
De Soto, Arcadia
Duval, Jacksonville
Escambia, Pensacola
Flagler, Bunnell
Franklin, Apalachicola
Gadsden, Quincy
Hamilton, Jasper
Hernando, Brooksville
Hillsborough, Tampa
Holmes, Westville
Jackson, Marianna
Jefferson, Monticello
Lafayette, Mayo
Lake, Tavares
Lee, Myers
Leon, Tallahassee
Levy, Bronson
Liberty, Bristol
Madison, Madison
Manatee, Braidenton
Marion, Ocala
Monroe, Key West
Nassau, Fernandina
Okeechobee, Okeechobee
Okaloosa, Milligan
Orange, Orlando
Osceola, Kissimmee
Palm Beach, West Palm Beach
Pasco, Dade City
Pinellas, Clearwater
Polk, Bartow
Putnam, Palatka
St. John, St. Augustine
St. Lucie, Fort Pierce
Santa Rosa, Milton
Seminole, Sanford
Sumter, Sumterville
Suwanee, Live Oak
Taylor, Perry
Volusia, Deland
Wakulla, Crawfordville
Walton, De Funiak Springs
Washington, Vernon

Defense.— The militia, known officially as the National Guard of Florida, is composed of infantry, artillery and a detachment of sanitary troops. The headquarters are located at Tallahassee. On 30 June 1917 its total strength was 2,842 officers and men. The Federal government maintains naval stations at Key West and Pensacola.

History.—*Exploration Period.*—The earliest attempted colonization of the North American mainland was in Florida, and the first white settlement was Saint Augustine. The history of the early expeditions is fascinating. It was not the lure of gold that drew thither the Spanish conquistadores from the islands of the Spanish Main, but the search for a mysterious island named Bimini where there was a fountain which banished age and its disabilities. On 23 Feb. 1512 Juan Ponce de Leon received from the Spanish Crown a patent of discovery and permission to proceed to discover and settle the Island of Bimini. With the wealth he had accumulated in his public employments in Porto Rico and elsewhere he proceeded to equip vessels for his expedition. In that day of great discoveries he found no difficulty in securing followers for his chimerical journey in search of the Fountain of Youth. Troubles beset him, however, and after a detention of a year in Porto Rico, where he aided in the subjugation of the aborigines, he set out on his voyage of exploration in March 1513. On the 27th he discovered the coast a little north of Saint Augustine; he cruised along the coast and on 2 April 1513 made a landing in lat. 30° 8′ From the appearance of the land, and because he first came upon the coast on Easter Sunday (Sp. *Pascua florida*), the name Florida was given to the island, as he then supposed it to be. Formal possession was taken in the name of His Most Catholic Majesty, the King of Spain, and all swore allegiance to that monarch. After two months spent in further exploration Ponce de Leon reembarked and proceeded southward along the coast. His next landing was attempted near an Indian village, but the hostility of the latter prevented a landing and the voyage was continued around Cape Corrientes, where a chain of islands was discovered, to which was given the name of The Martyrs. Hostility of the natives obliged the explorer to push on and he discovered and named the Tortugas. He returned to Porto Rico without finding the object of his quest, the Fountain of Youth.

His glowing account of the riches of «the island of Florida,» on his return to Spain, caused him to be appointed Adelantado of this land and a new patent was granted him. Delay upon delay ensued and it was not until 1521 that he again set forth. Meanwhile other Spaniards had visited Florida and proved it to be a peninsula. Ponce now dreamed of founding a great empire and set about the conversion of the aborigines to the Christian faith. The exact place of his debarkation is unknown; he was attacked by hostile Indians; was himself severely wounded; sickness spread among his followers, and he decided to abandon the attempt to colonize Florida. He withdrew to Cuba, where he died soon after. Between 1520 and 1526 Vasquez de Ayllon raided Florida for slaves but made no attempt at settlement or exploration. The second man to attempt its exploration was Pánfilo de Narvaez, who in 1529 began his fatal expedition westward from Pensacola Bay. After treading unknown wildernesses to the westward, the leader perished at sea, and of his followers only five escaped the fevers and the hostile natives. One of these was Cabeça de Vaca, who after seven or eight years of servitude among the Indians finally reached the Spanish settlements of Mexico. The next expedition was on a more pretentious scale. Its leader was Hernando de Soto, who had been one of the leading generals of Pizarro in Peru. Led on to dreams of empire by the returned adventurer, Cabeça de Vaca. De Soto determined to conquer the supposedly rich land of Florida, determined to write his name as high as those of Cortez and Pizarro who had conquered whole empires for Spain. On 6 April 1538 he put to sea from Spain in 10 vessels with a great band of followers. He stopped off at Santiago de Cuba and at Havana, and not until 25 June 1539 did his expedition reach Tampa Bay. De Soto explored a great part of the peninsula in 1539 and the following year, but great numbers of his followers were slain by the Indians, all of whom manifested the greatest hostility to the white men. After weary months of wandering through the primeval wilderness his party reached the Mississippi where De Soto died of fever. In 1559 an expedition on a large scale was prepared to conquer the peninsula, where so much disaster had attended the Spaniards. In that year Don Tristan de Luna set out from Vera Cruz with 1,500 soldiers and a number of priests and monks. On 14 Aug. 1559 he arrived in Pensacola Bay; an expedition was sent into the interior, but disaster after disaster followed, the ships were lost in a hurricane, food supplies became exhausted; the party became divided in its counsels, and De Luna was recalled in 1561, having accomplished nothing.

The Huguenots.— Coligny, designing to found a Huguenot colony and refuge in the New World, sent out a company, in 1562, under Jean Ribaut, who founded the colony of Port Royal, S. C. In 1564, Ribaut's colony having failed, René de Laudonnière, in charge of a new company of Huguenots, built Fort Caroline on the Saint John's River. The colony did not prosper and Laudonnière was about setting out for home, when he was joined by Ribaut and 300 men from France. On 28 Aug. 1565 Pedro Menendez de Avilez at the head of a Spanish expedition cast anchor in the Bay of Saint Augustine. His object was to exterminate the Huguenot settlement. He captured Fort Caroline and put to the sword nearly the entire garrison «not as Frenchmen but as heretics.» Menendez thereupon founded Saint Augustine, explored the coast and built forts at San Mateo (Fort Caroline), Avista, Guale and Saint Helena. Menendez returned to Spain in 1567. The brutal murder of the French Huguenots did not long remain unavenged despite the indifference manifested at the French court. Dominique de Gourgues, friend of Jean Ribaut, but probably a Catholic, gathered a body of picked men with the ostensible object of kidnapping slaves on the African coast, keeping the true design to himself until his ships were nearing the coast of Florida. His followers after he made it known to them endorsed the project for revenge and with the aid of the Indians De Gourgues took Fort San Mateo in 1568. On the very spot where Menendez had executed the garrison of Fort Caroline, De Gourgues hanged all of the Spaniards that remained after the assault on the fort, and inscribed a tablet of firewood: «I do not this as unto Spaniards, not as unto Mariners, but as unto Traitors, Robbers, and Murderers.» The Spaniards at Saint Augustine being in too great force, De Gourgues refrained from attacking them and returned to France, his mission accomplished.

Colonial Period.— After the stirring events just narrated a century elapsed without any attempt being made by the Spaniards to extend their settlement beyond the Atlantic coast. The total results of 100 years of Spanish domination were three small fortified posts and a few scattered missions among the aborigines. In 1586 Saint Augustine was burned and destroyed by Sir Francis Drake, and in 1665 English buccaneers under John Davis plundered it. In 1696 the Spaniards, jealous of the extension of the French settlements in Louisiana, turned for the first time toward the Gulf coast and founded Pensacola. French settlements by 1702 limited Florida to the Perdido River on the west while to the north the English colonial grants placed another limitation on the claims of Spain in that direction. All through the 17th and early 18th centuries the Spaniards in Florida are alleged to have harassed or set on the Indians to harass, the English settlements, especially after Georgia was settled. Saint Augustine was captured and burned by a force from South Carolina in 1702, Spain and Great Britain being then at war. The fort was not reduced, however, and the English withdrew upon the approach of reinforcements to the Spaniards. In 1708 and again in 1722 the Carolinians invaded Florida and in 1740 Gen. James Edward Oglethorpe, governor of Georgia, attacked Saint Augustine, and made a second attempt in 1745. Pensacola was taken by the French in 1719 and held by them for five years. In 1763 East and West Florida — the latter west of the Apalachicola, and including parts of modern Alabama and Mississippi — were ceded to Great Britain under the terms of the Treaty of Paris. Civil government now displaced the military and a period of great prosperity ensued. Roads were laid out and many of them built, and in 20 years more than 25,000 white immigrants settled in Florida. During the War of Independence most of the white population of Florida remained loyal to England. Plans were made to invade Georgia and South Carolina, and in 1778 a Florida expedition took part in the siege of Savannah, Ga. In 1779 the Spaniards of New Orleans seized the English post in West Florida and took Pensacola in 1781.

In 1783 Florida was retroceded to Spain at the Treaty of Paris. Since that treaty did not guarantee the religious liberty of the English settlers many of the latter withdrew. In 1795 the northern boundary was placed at the line of 31 north latitude by treaty with the United States. In the same year West Florida was sold to France. After the Louisiana Purchase of 1803 the United States claimed up to the Perdido as part of «Louisiana»; the claim was not then pressed, for fear of war; but in 1810, the Spanish monarchy being overthrown and the king a prisoner, the United States took possession of all but Mobile, which was occupied in 1813 at the time of the War with Britain. West Florida was declared an independent State on 26 Sept. 1810 by the settlers, who set up a government and asked for admission to the Union. President Madison declared West Florida under the jurisdiction of the United States, and in 1812 that part of West Florida between the Pearl and Mississippi Rivers was added to Louisiana and that between the Pearl and Perdido Rivers was incorporated with Mississippi.

During the War of 1812 the English in 1814 landed a garrison at Pensacola, with the connivance of the Spaniards. Their stay was short, however, as Gen. Andrew Jackson took Pensacola in November 1814. The British next built a fort on the Apalachicola from which Indians and fugitive slaves were sent against the Americans. The so-called Spanish «government» at this time was mere anarchy, partly from there being no stable home government to control it; Indian bands raided Georgia and escaped over the border, British and Spanish traders intrigued with them, and it was an Alsatia for fugitive slaves which drove the slaveholders wild. Congress authorized Madison to take «temporary possession» in 1811, but nothing was done; in 1818 Jackson invaded it to punish Spanish assistance to the Seminole raids and the withholding of fugitive slaves, captured Saint Marks and Pensacola, and hanged Arbuthnot and Ambrister, two British adventurers making profit by furnishing supplies and possibly other help to the Indians.

Annexation and Statehood.— The district being both profitless and untenable to Spain, she ceded it to the United States by treaty of 22 Feb. 1819, in exchange for government assumption of $5,000,000 claims of American citizens against Spain. The treaty was ratified in 1821, and in March 1822 it was admitted as a Territory of the United States and the military authority was superseded by the civil. The two sections, East and West Florida, both from geographical and political reasons, had no sympathy with each other, and repeatedly petitioned Congress for separation, without avail. Especially West Florida, as late as 1869, voted for annexation to Alabama, which offered Florida $1,000,000 for it; but no further steps were taken. Self-government was very limited at first. The government consisted of a governor appointed by the President and a council of 13, appointed annually. After 1826 members of the council were elected by the people, and after 1834 there were 26 members in the council. A stable government and the immigration of white settlers from the Southern States ushered in a period of prosperity which was handicapped by frequent forays of the Indians. From 1835 to 1842 the Seminole War was waged and at its close all but a few hundred of the Seminoles were placed on reservations in Indian Territory. On 11 Jan. 1839 a convention passed a constitution for the State of Florida, but it was not admitted to the Union till 3 March 1845, paired with Iowa, as a slave State with a free State. The constitution, forbidding emancipation of slaves by the legislature, roused a violent debate in Congress over admission.

Civil War and Reconstruction.— On 10 Jan. 1861 Florida passed an ordinance of secession by a vote of 62 to 7; on 21 January her senators withdrew from Congress; on 4 February her delegates took their seats in the Confederate Congress, and on the 17th she became a member of the Confederacy. The government posts in the State nearly all fell into Confederate hands; but Fort Pickens, off Pensacola, and the forts at Key West and the Tortugas were retained and formed a nucleus for recapture. Most of the coast towns were captured by the Federals during the first two years of war. But the State remained in the Confederacy. After 1863, however, the Union forces were employed in other quarters; and by the battle of Olustee, 20 Feb. 1864, the State was acknowledged lost to the Union till the close of the war. On 20 May 1865 all slaves in the State were freed. On 13 July 1865 a provisional government was formed; on 25 October a State convention met, which on the 28th annulled the ordinance of secession. A new constitution was adopted without slavery and a legislature organized in 1866; but on 2 March 1867 it was brought under the Reconstruction Act, and became a part of the Third Military District. A constitution was ratified by popular election in May 1868, the legislature met the 8th June following and ratified the 13th and 14th Amendments to the Federal Constitution, and on 25 June 1868 Florida was reorganized as a State. On 4 July the government was transferred to the civil authorities and the new State officials assumed office. The extravagances of the Reconstruction government brought about a great increase in the State's indebtedness and taxes were burdensome for many years. Only in 1873 did the yearly revenue of the State equal the current expenses of government and the interest on the State debt.

Modern Development.— The 70's were marked by bitter political contests, power gradually passing back to Democratic hands. In 1876 the State's electoral vote was disputed, but the vote was at length given to Hayes, after a visit of a commission to Florida. The late 80's witnessed the discovery of the great deposits of phosphate rock and economic conditions began to improve rapidly. This decade and the 90's saw railroads extended throughout the State, and the east coast became a popular winter resort.

Railroad development was in great part due to the foresight of Henry M. Flagler, who saw the latent wealth of the State and its possibilities as a fruit-growing centre as well as a health and pleasure resort. The investments of Northern capital in industries and railroads, the Federal work on harbors, rivers, etc., have made Florida a strong and thriving State. In State elections the Democratic majority is well over 30,000. Except in a Presidential year, it is not usual for the Republican party to nominate a full State and congressional ticket. Since 1910 Florida sends four representatives to the lower house of Congress.

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FLORIDA, Gulf of. See Florida Straits.

FLORIDA, Treaty of. In American history, a treaty signed between Spain and the United States, 22 Feb. 1819, by which Spain conceded the Floridas to the United States. Until the final ratification of the treaty Congress had passed a law empowering the President to appoint a governor, and Gen. Andrew Jackson assumed command of the Florida region. General Jackson issued a proclamation at Pensacola requiring obedience to United States authority. See Florida; United States — Arbitration in the.

FLORIDA, University of, located at Gainesville, Fla., dates from 6 July 1905 when the State Board of Education and the Board of Control in joint session, acting under powers conferred by the legislature, co-ordinated previous State efforts at higher instruction and organized the Florida Female College at Tallahassee and the University of the State of Florida at Gainesville. Both these institutions began their scholastic work in September 1905. In 1909 an act of the legislature changed the name of the one to the Florida State College for Women; of the other to the University of Florida. Now ranking with the best universities of the nation its departments comprise the College of Arts and Sciences leading to the degrees of B.A. and B.S.; the College of Agriculture which confers the degree of B.S.A.; the College of Engineering leading to the degree of B.E.; the College of Law, the LL.B. degree of which admits to the bar without further examination; the Teachers' College conferring the degrees of B.S. and B.A. in philosophy and education and providing normal training for those desiring to enter any department of the public school service, State certificates are granted to Normal School and Teachers' College graduates without further examination; the Graduate School offering courses leading to the degrees of M.A. and M.S.; the Agricultural Experiment Station for agricultural research; and the University Extension Division serving Farmers' Institutes, Boys' and Girls' clubs, correspondence courses, lecture bureau, etc. Apart from legislative appropriations, the annual income of the university derived principally from Federal grants amounts to $34,750; for the support of the Agricultural Experiment Station the Federal government makes two annual grants totaling $30,000. Three fellowships and four scholarships are offered deserving students and a loan fund enables students to enter the College of Agriculture. The university occupies a tract of 604 acres, 90 of which are devoted to campus, drill-grounds and athletic fields; the remainder is used by the College of Agriculture. Handsome buildings have been erected furnished with all modern improvements and appliances. The faculty numbers 73; the average annual student enrolment is 800, with an additional 200 to 230 enrolled in boys' short course and in correspondence courses.

FLORIDA AGRICULTURAL COLLEGE, an important educational institution at Lake City, Fla., established in 1884 and affiliated to the University of Florida (q.v.). It is under the direct control of a State board appointed by the governor. There is an average annual attendance of 200 students of both sexes.

FLORIDA BLANCA, flō-rē'thä blän'kä, **José Moñino,** Count of, Spanish statesman: b. Hellin, Murcia, 21 Oct. 1728; d. Seville, 20 Nov. 1808. He was Spanish Ambassador at Rome during the pontificate of Clement XIV and particularly distinguished himself by his activity in the abolition of the order of the Jesuits and in the election of Pius VI. In 1777 he became Minister of Foreign Affairs and at once acquired almost unlimited authority in Spain. He introduced post-coaches and caused the post-roads to be made practicable; directed his attention to the most important subjects of general police, particularly in the capital; embellished Madrid, and was on every occasion the active friend of the arts and sciences. His attack upon Algiers in 1777 and the siege of Gibraltar in 1782–83 were unsuccessful; but the result of his co-operation with the English colonies of North America in securing their independence was more favorable to Spain. After the accession of Charles IV, his enemies succeeded, in 1792, in effecting his disgrace. He was imprisoned in the citadel of Pampeluna, but was soon restored to liberty and banished to his estates. He appeared once more upon the political stage in 1808, when he was president of the extraordinary Cortes.

FLORIDA CAPE. See Cape Florida.

FLORIDA JAY. See Jay.

FLORIDA KEYS, or REEFS, in Florida, a chain of small islands, keys or reefs, of coral or limestone, extending southwest from Cape Florida, about 220 miles. They are very considerable in number, but only a few are of any importance. Among these may be mentioned Cayo Largo, Indian Key, Long Island, Old and New Matacombs, Cayo de Boca and Key West, on which the city of Key West is built. In 1910 the railway to Key West joined 41 of the keys. The only local industry of importance is sponge fishing, which returns upwards of $650,000 annually.

FLORIDA STATE COLLEGE FOR WOMEN, reorganized by act of the legislature 5 June 1905, is situated at Tallahassee, Fla., where, first as a seminary, it had been in operation from February 1857. Six State institutions of learning were merged 5 June 1905 into the University of Florida for the education of men at Gainesville, and the Florida State College for the education of women at Tallahassee. The college grounds comprising campus and farm cover 150 acres; five commodious modern buildings are fully equipped with all facilities for higher instruction; and 11 scholarships attract promising students. The departments are college of arts and sciences, school of education and normal school and special schools of business, art, music and home demonstration work, leading to the degrees of B.A., M.A. and M.S. The faculty numbers 42; the average annual attendance of students, regular term, is 600, summer school 360; total enrolment, excluding duplicates over 950.

FLORIDA STRAITS, or **NEW BAHAMA CHANNEL.** The gulf waters separating Florida from Cuba and the Bahamas, and traversed by the Gulf Stream. The total length is 300 miles, with a width of from 50 to 150 miles. The main channel has been sounded to a depth of over 6,000 feet.

FLORIDIA, Sicily, city on the River Ciani, six miles west of Syracuse. Grain, wine and olives are produced in the vicinity. Pop. 12,500.

FLORIDSDORF, Austria, a suburb of Vienna, three miles north of that city. It is a thriving industrial centre, with manufactures of locomotives, carriages, chemicals, rubber goods, pottery, hardware, etc. In 1896 it was made the seat of a district. Pop. 38,700.

FLORIEP, Robert, German physician: b. Jena 1804; d. 1861. He received his education at the University of Bonn, and after 1833 was connected with the Pathological Museum of the Charité in Berlin. His work ‘On the Therapeutic Application of Electro-Magnetism in the Treatment of Paralytic and Rheumatic Affections’ (Eng. trans. by R. M. Lawrence 1850) was the most important contribution to electrotherapy of its day. He is also well known for his medical and surgical atlases, the principal of which were ‘Chirurgische Kupfertafeln’ (1820–47); ‘Klinische Kupfertafeln’ (1828–37); ‘Atlas der Hautkrankheiten’ (1837) and ‘Atlas Anatomicus’ (6th ed., 1877).

FLORIKIN. See Florican.

FLORIN, a coin first struck in Florence in the 13th century. The silver florins of Holland are worth about 40 cents. The British and Austrian florins are each worth 50 cents. The English florin was first coined in 1849. See Numismatics.

FLORIO, Caryl. See Robjohn, W. J.

FLORIO, John, English author: b. London, about 1553; d. Fulham, 1625. His father was a Florentine Protestant, who fled to England to escape persecution. He taught Italian at Oxford and London, having among his pupils several men of note. He achieved repute as a translator and lexicographer. His ‘First Fruits which yield Familiar Speech,’ a series of dialogues in English and Italian, appeared in 1578 and was followed in 1580 by an English version of Ramutius' Italian translation of Jacques Cartier's ‘Two Voyages to New France.’ Encouraged by the success of the former he issued in 1591 a volume of similar nature entitled ‘Second Fruits.’ In 1598 appeared the well-known Italian-English dictionary ‘A World of Words,’ dedicated to the Earl of Southampton, and which gave the author wide distinction. In 1601–03 he translated into English Montaigne's ‘Essays,’ which work was often reprinted. After the accession of James I, Florio became French and Italian tutor to Prince Henry, and later gentleman of the privy chamber and Italian reader to the queen. He was the friend of Shakespeare, Ben Jonson and Sir Francis Bacon, and was pensioned for having made the latter's works known abroad.

FLORIS, Frans. See De Vriendt, Frans.

FLORISSANT BEDS, a group of sedimentary rocks, occupying the site of a lake, near Florissant, Colorado. The group is famed for its Tertiary fossils. Consult reports of the United States Geological Survey.

FLORISTICS. See Ecology; Plants, Distribution of.

FLORIZEL, in Shakespeare's ‘Winter's Tale,’ the Prince of Bohemia, hero of the drama and the lover of Perdita.

FLORUS, Roman historian, of the 2d century A.D., probably a native of Spain or Gaul. He is variously styled in the manuscripts; in some L. Annæus Florus, in others L. Julius Florus, in others L. Annæus Seneca and in one simply L. Annæus. He wrote an abridgment (epitome) of Roman history in four books, from the foundation of the city to the first time of closing the Temple of Janus, in the reign of Augustus. His style is florid, and not sufficiently simple for history. The best edition is that of Duker (Leyden 1744); later ones are by Titze (1819) and Seebode (1821).

FLOSS SILK, the portions of raveled silk broken off in reeling the silk from the cocoons, carded and spun into a soft untwisted yarn and used for embroidery, etc. See Silk and Silk Industry.

FLOTATION. See Chemistry, Progress of; Gold Mining.

FLOTATION PROCESS IN METAL MINING, The. Flotation is a metallurgic process in which valuable metallic minerals are extracted from ores by methods that cause the mineral particles of the pulp to float. A pulp is a mixture of finely crushed ore and water. It has been assumed that this new process is a physical contradiction of the old methods of concentration, in which the force of gravity was the principal factor. Such an interpretation is not permissible because gravity has not been outlawed by flotation; on the contrary the new process is dependent upon the action of the same force. The mineral particles that ascend in the new apparatus are as obedient to gravity as the particles that descend in the old machines. The difference lies in the interplay of molecular forces, notably surface-tension, which is a phase of cohesion, that is, the attraction that binds molecules of like kind to each other. In consequence, the surface of a liquid acts as if it were a stretched membrane or an elastic film.

The earliest practicable method of flotation was invented by F. E. Elmore in 1898. It was based directly upon the buoyancy of oil. This is a simple manifestation of gravity, whereby an oil, lighter than water, will rise to the surface of a pulp and carry with it any mineral particles that have become entrained in it. The oil plays the part of a raft or boat. Owing to the small flotative margin offered by common oils, which have a specific gravity of about 0.9 as against the 1 of water, this method involved the use of so much oil that it proved impracticable in metallurgic practice. As first used it required a ton of oil to treat a ton of ore.

Next, the direct effect of surface-tension on water was utilized in methods invented in Australia, where they were patented by G. D. Delprat and C. V. Potter in 1902. Such processes come under the heading of film-suspension; they are typified by the floating of a needle on water. In the familiar experiment a small needle is greased, although it will float without the aid of grease. Little or no oil is employed in these processes, which show that bubbles of air entangled in the pulp, or of gas generated therein by the addition of acid, are effective for flotation.

Then came the third and much the most important development of this branch of metallurgy. Several investigators, notably, H. L. Sulman and H. F. K. Pickard, made use of the experience obtained in the Australian mills and, in 1904, developed a process in which bubbles of air became the principal agent. This phase of flotation may be called bubble-levitation; it depends upon the attachment of bubbles of air to the metallic minerals in preference to the gangue, such preference representing an affinity or selectiveness that is enhanced by the presence of a small proportion of oil, even less than 1 per cent on the weight of the ore. Whether the result be due to the oiling of the bubble-film or to the oiling of the metallic surface of the mineral particles is not yet clear, but it is recognized that the oil affects the surface-tension of the water of the pulp in such a way as to strengthen the bubble-films and cause the bubbles to last longer. The bursting of a bubble is due to the contractile force of surface-tension, and it must be moderated if the bubble is to last long enough to perform its metallurgic function.

The process now in use on a big scale in the United States is one in which a multitude of bubbles, developed in a pulp of ore, is utilized as a means for separating the valuable minerals from the valueless gangue. This separation is based on the fact that sundry minerals (especially sulphides) exhibit a preference for air-bubbles when these are made in a liquid modified for the purpose by the addition of a substance that produces a variable surface-tension. The bubbles result from the dispersion of air in the pulp, whether entrained by agitation or blown through the porous bottom of the vessel in which the operation is conducted. These bubbles rise, and the variable surface-tension produced by the modifying agent added to the water hinders the coalescence of the bubbles while they are rising. The modifying agent may be a constituent of various oils or it may be any one of many other substances, including chlorides of the alkalis; it enters into the bubble-films between water and air, where the mineral particles are caught and held at the interface. The mineral-laden bubbles, arriving at the surface, aggregate into a froth, which is withdrawn, to be collected as a concentrate, which is then drained, filtered, and dried previous to reduction by smelting in the ordinary way.

The first successful application of this method in the United States was made by James M. Hyde, in the mill of the Butte & Superior Mining Company, at Butte, Montana, in 1911. This was followed immediately by a suit for infringement of patent brought by the Minerals Separation company, the British corporation owning the Sulman and Picard patents. The litigation is still in progress, after a number of decisions of an indeterminate character, reflecting the lack of scientific knowledge concerning the fundamental physical principles involved in the process. It is even doubtful whether oil is necessary, for experiments have been made indicating that plain sea-water, without an addition-agent, will produce a mineral-bearing froth adequate for the concentration of chalcopyrite in the presence of pyrite and pyrrhotite. This calls to mind the fact that flotation can be made preferential as between minerals by creating conditions that affect some and not others. For example, lead sulphide can be separated from zinc sulphide by a superficial oxidation of the lead in a roasting-furnace without affecting the zinc, so that the latter is amenable to flotation, whereas the former becomes refractory.

The cost of operation can be given only in general terms; suffice it to say that the process usually requires no new methods of crushing or of preliminary treatment, but it does demand finer reduction of the ore, say, to 80-mesh. Flotation machines are relatively simple and inexpensive, costing about $8 to $12 per ton for a capacity of 200 tons daily and $4 to $6 per ton for a capacity of 5,000 tons daily. The cost of operating them, including labor, power, and reagents, is about 10 to 15 cents per ton for a 500-ton plant. The oils used are classified as «frothers» and «collectors.» The selection of them is empirical. Products of distillation from wood and from coal are used; also petroleum products. The creosotes and kerosene-acid sludge are common agents for froth-flotation.

The process is applicable to a remarkable variety of ores, including those of copper, lead, and zinc, as well as those of gold and silver. Apparently minerals having a high metallic lustre are particularly amenable. This includes most of the sulphides of the useful metals and excludes most of their oxides; indeed the presence of oxidized material in the copper ores now being treated is the principal reason for a relatively low recovery, say, 70 per cent, as against the high recovery, say, 90 to 95 per cent, on clean copper sulphides. However, methods for treating the oxidized ores of copper and of lead have been devised, and have been tried on a working scale. The most promising of these are based upon the sulphidizing, or coating of the oxides with a film of artificial sulphide, so as to present a surface suitable for flotation. Hydrogen sulphide is used for this purpose; or the sulphides of calcium and sodium; also sulphur in various combinations. As yet, a sodium sulphide, in 1 per cent solution, has given the best results on oxidized lead ore. The process has an application as much wider than that of cyanidation as cyanidation was more comprehensive than chlorination. About 30,000,000 tons of ore are being treated annually by flotation in the United States, and as soon as the embargo of royalty or of litigation is lifted from the process there should be an extension of its usefulness in this and in other countries.

A large body of technical literature has grown around the subject during the last three years. The principal textbooks are Hoover, Theodore J., 'Concentrating Ores by Flotation,' (1912); Rickard, T. A., 'The Flotation Process'

(1916); Rickard, T. A., and Ralston, O. C., 'Flotation' (1917).

T. A. RICKARD,
Editor of 'Mining and Scientific Press,' San Francisco.

FLOTOW, Friedrich (frēd'riн flō'tō) **von**, German musical composer: b. Teutendorf, Mecklenburg-Schwerin, 27 April 1812; d. Wiesbaden, 24 Jan. 1883. His earlier operas (which include one called 'Rob Roy') did not find favor among the Parisian opera house directors, so he had to content himself with performances in the private theatres of the aristocracy. This brought him gradually into notice, however, and his 'Naufrage de la Méduse' was publicly produced in 1839. 'Alessandro Stradello' was first performed at Hamburg in 1844 and his most successful opera, 'Martha,' was originally given at Vienna in 1847. His subsequent works, such as 'Indra' (1852), 'Rübezahl' (1854); 'Albin' (1856); 'L'Ombre' (1869), achieved but small success. He was elected to the French Institute in 1864.

FLOTSAM, JETSAM, and LIGAN, in law, flotsam, or floatsam, is derelict or shipwrecked goods floating on the sea; jetsam, goods thrown overboard which sink and remain under water; and ligan, goods sunk with a wreck or attached to a buoy, as a mark of ownership. When found such goods may be returned to the owner if he appear; if not, in England, they are the property of the Crown. See DERELICT; SALVAGE.

FLOUNDER, any of several of the more common and useful flat fishes (q.v.) of northern waters. There are at least 500 species. The commonest American species are the "summer" and "winter" flounders. The latter (*Pseudopleuronectes americanus*) is dark rusty brown, more or less spotted, about 15 inches long when mature and weighs one to two pounds. It is caught in the colder months from Chesapeake Bay to Labrador, and is excellent eating. The "summer" flounder (*Paralichthys dentatus*) becomes twice as large, is light olive brown, studded, when adult, with numerous small white spots and is esteemed for the table. The "four-spotted" flounder (*P. oblongus*) and the Gulf species (*P. albiguttus*) are closely related. On the Pacific coast several good species are known; and the British coast has a valuable species in *Pleuronectes flesus*, closely resembling the plaice (q.v.). The halibut (q.v.) is closely related and the turbot (q.v.). Consult Jordan, 'Guide to the Study of Fishes' (1905). See FLUKE; FISH.

FLOUR. See FLOUR, WHEAT.

FLOUR, Wheat, a finely ground and bolted product used for food. Ordinary white or bread flour, of which there are a number of grades, is composed of the interior portion of the wheat kernel subjected to processes of pulverization and purification. In the preparation of white flour either the major portion or all of the bran, germ and other offal parts are removed. When the entire wheat kernel is ground into a meal, it is called graham flour. When a portion of the bran is removed the product is usually called purified graham or entire wheat flour.

The history of wheat milling shows that many and gradual changes have taken place since the early times when wheat was pulverized between stones to the present time when it is reduced by steel rolls. Wheat has variously been reduced to flour by means of stone crushers, saddle stones and stone mortars. The ancient Greeks, Romans, Chaldæans and Egyptians used saddle stones for grinding wheat into flour, the wheat being placed in a concave stone and rubbed with a convex stone rocked backward and forward. Saddle stones are still in use among the native Africans, and are known to have been used from earliest times. They are also found among the remains of the prehistoric Swiss lake-dwellers and mention is made of them in the earliest literature. Their use appears to have been common among all primitive races and they are in use to-day by many barbarous and half-civilized nations. Near the beginning of the Christian era, querns or crude crushers in which the parts were fitted mechanically came into use. The upper stone or pestle revolved upon the lower concave stone. The quern was the forerunner of the millstone. Querns are still in use in some Asiatic and European countries. The millstone came into use about the 14th century and was the result of gradual evolution from the stones shaped by nature and operated by hand to specially hewn and dressed millstones propelled by various forms of motive power. In ancient times, flour was prepared in each household, the grinding being done by women, slaves and menials. During the Middle Ages when the feudal system was at its height, crude flour-mills or querns formed a part of the outfit of each castle or estate. In some countries, the right to operate these mills was vested in the clergy, and in early English history frequent mention is made of contests between the people and the landlords and clergy relative to their right to operate these mills or querns.

Until the beginning of the 17th century wheat milling was simply a crude agricultural industry, the earlier mills being operated by slaves, then by oxen. Later water wheels and windmills were used as motive power. About 1820, a flour-mill was first operated by steam. Bolting cloths for removal of the bran have been in use for about two centuries.

About 1870 the present roller process of flour production was introduced from Hungary into America. The process consists of the gradual reduction or pulverization of the floury portions of the wheat kernel between corrugated and smooth steel rolls and of the purification of the product by means of aspirators. During the process of milling, the granular middlings undergo gradual reduction and are passed from roll to roll. At each break or grinding, the fine flour is removed by bolting, the middlings are separated and passed to other rolls and the tailings are subjected to further reduction. Before passing to the rolls, the wheat is screened to remove loose dirt and weed seeds and occasionally washed to remove adhering dirt and debris; then dried or tempered with steam, as may be necessary in order to more easily effect reduction. The first break simply flattens the kernels after splitting them in halves along the longitudinal groove. The germ is pinched off by the rolls and is readily separated. The flour passes automatically from one break or set of rolls to another. Each break is regulated so as to pulverize a little finer than the preceding one. Each middlings stream is purified by passing through the middlings purifier, suction being applied to remove the fine dust and dirt. Finally the various streams are blended so as to form different grades of flour. In large mills, the cleaned wheat is usually elevated to the top of the mill and then passed on to the rolls, and the various resultant flour streams blended in such a way that the final flour product is obtained after being separated into 40 or more separate streams.

The introduction of the roller process of milling has made it possible to use varieties of wheat from which high-grade flour could not be made by the old stone process. By the roller process of reduction a portion of the hard granual middlings which were formerly excluded from the flour and sold with the by-product used for animal feeding are now reduced and added to the patent grades of flour. About 75 per cent of the cleaned wheat is returned as merchantable flour, 72 per cent being straight grade or ordinary white flour. In ordinary milling, the grades are as follows: (1) patents; (2) straight, sometimes called standard patent; (3) first clear: (4) second clear. Patent flour is the highest grade manufactured. Its gluten has greater power of expansion and absorbs more water than that from any other grade. Patent flour produces the whitest and largest sized loaf of bread. Straight or standard patent flour is similar to the patent, but the bread is slightly darker in color and the gluten does not possess quite so high a power of expansion. First clear grade flour is obtained after the removal of the first patent grades. This flour is slightly darker in color and produces a less pleasing loaf than the patent grades. Second clear or low grade is the name given to a small amount of flour obtained after the removal of the first clear. In some mills about 12 per cent of the cleaned wheat is recovered as first clear flour and about 5 per cent as second clear or low grade. When the wheat is milled so that the patents and the first clear are all obtained as one flour, the product is called straight grade. This is the flour that is extensively used for bread-making purposes. Straight flour is the sum of the patents and the first clear. The lowest grade of flour manufactured is called red dog; it is dark in color and possesses but little power of expansion. It is secured largely from those portions of the wheat kernel adjacent to the germ and aleurone layers. Red dog flour is not generally used for human food, but is employed in the arts, for the feeding of animals and occasionally in the preparation of some cereal breakfast food. It has a high per cent of protein or nitrogenous material, but is not valuable for bread-making purposes because the gliadin and glutenin (see BREAD AND BREAD MAKING) are not present in the right proportions to form a balanced gluten. By blending the different streams of flour, various commerical grades sold under different trade names are secured. The composition and properties of different kinds of flour result from the kind of wheat used in preparation (see WHEAT) and the method of milling employed. The percentage amounts of bran, shorts and standard grades of flour obtained by the roller process vary widely with different kinds of wheat. Some wheats yield more flour than do others. The average yields are approximately as follows:

	Per cent of cleaned wheat recovered
1. Patent (about)	60
2. Straight or standard patent *	70 to 73
3. First clear or first bakers	10 to 15
4. Second clear or low-grade	0.5 to 3
5. Red dog	1½ to 2
6. Shorts or middlings	11 to 12
7. Bran	13

By the roller process of milling, the germ is excluded because of its poor bread-making properties and its fermentable nature. The wheat offals of which shorts and bran form the main portion are by-products used for the feeding of animals. About 25 per cent of the cleaned wheat finds its way into the offals. Bran is the episperm or outer covering of the wheat kernel. As human food, it is indigestible and does not yield as large an amount of available nutrients as the floury part of the wheat kernel. As an animal food, however, it has a high value. Shorts consist mainly of the fine bran mixed with some of the floury portions of the wheat kernel. When the wheat screenings, consisting of weed seeds and other refuse, are ground and mixed with the offal, the product is known as bran or middlings, with ground screenings. From 1.3 to 1.6 per cent of the weight of the cleaned wheat is recovered as germ.

Wheat flour is composed of starch, gluten proteins, water, fat, ash, or mineral matter and small amounts of other compounds, as sugars, cellulose, organic acids, amids, etc. The proximate composition of the different kinds of flour when milled from the same lot of hard wheat is given in the following table:

(The two types of patent flour could not be milled at the same time).

	Water, Per Cent	Protein (Nx 5.7) Per Cent	Fat Per Cent	Carbohydrates Per Cent	Ash Per Cent	Phosphoric Acid Per Cent	Acidity Per Cent	Heat of Combustion per Gram. Determined. Calories
Wheat	8.50	12.65	2.36	74.69	1.80	0.75	0.18	4.140
Special patent flour	10.55	11.08	1.15	76.85	.37	.15	.08	4.032
Patent flour	10.49	11.14	1.20	76.75	.44	.17	.08	4.006
Straight flour	10.54	11.99	1.61	75.36	.50	.20	.09	4.050
First clear grade	10.13	13.74	2.20	73.13	.80	.34	.12	4.097
Second clear grade	10.08	15.03	3.77	69.37	1.75	.56	.27	4.267
Red dog flour	9.17	18.98	7.00	61.37	3.48	....	.59	4.485
Shorts, middlings	8.73	14.87	6.37	65.47	4.56	....	.14	4.414
Bran	9.99	14.02	4.39	65.54	6.06	2.20	.23	4.198

From the table, it will be observed that there is a gradual increase in the amount of ash, proteins and fat from the first patent flour to the red dog or lowest grade of flour. In fact, the variations in ash content of the different

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* Straight grade flour is composed of first and second patents and first clear grade.

grades of flour are so regular that the percentage of ash can, at times, be taken as an index to the grade of flour. The highest grade flours, as first patent, contain least ash because of the more perfect exclusion of the bran and endosperm parts. In the straight grade or ordinary bread flour, there is only from .6 to .7 per cent less nitrogenous material as proteins than in the wheat from which it was milled. Second clear and red dog flours contain a large amount of protein, fat and ash, and judged by their proximate composition only, would appear to have a higher nutritive value than the patents or straight grade flours. But when judged on the basis of digestibility, available nutrients and physical character of the bread, these flours are found to have a much lower value than the patents or straight grade flours. (For nutritive values, see article on BREAD AND BREAD MAKING). During the process of milling, the flour particles pass through bolting cloths containing from 12,000 to 16,000 meshes per square inch, which results in even and fine granulation of the flour particles. The character of the flour particles as angular or spherical depends largely upon the character of the wheat as hard or soft, and to a less extent upon the method of milling. The flour granules from hard wheat are angular and have a sharp feeling akin to fine sand, while soft wheat flours produce small spherical particles lacking in gritty feeling.

Flours made from strong hard glutinous wheats contain more protein and have a higher food value than those made from soft starchy wheats.

In the testing of flour, particular attention is given to physical characteristics, as color, purity as indicated by absence of dirt and fine pieces of bran, capacity to absorb water, quality of gluten and character of the bread product. For bread-making purposes, the quality of the flour depends largely upon the amount and quality of the gluten. The gluten is obtained by making a stiff dough of the flour and then washing this dough with an abundance of water, which removes the starch, leaving the gluten in the form of a gum-like mass. Gluten from high-grade flours is firm, elastic, white or of slightly yellowish tinge and possesses good qualities of expansion. Poor gluten is dark in color, sticky and lacking in elasticity. The color of the flour depends largely upon the quality of the wheat and the method of milling employed. Some wheats produce creamy or yellowish flours, others chalk white flours and others dark-colored flours. Dark-colored flours, however, produce bread of inferior quality, creamy and white flours producing the best grades of bread. The granulation of the flour is also taken as an index of its quality, as it reveals to the experienced miller and baker the character of the flour. Comparative baking tests are generally resorted to in order to determine the bread-making value of flours. By these tests, under uniform conditions with the same amount of flour, yeast, water, etc., in each case, differences in the bread-making qualities of the flour are readily revealed. When flour is stored for a long time, it sometimes becomes inferior through fermentation. Ordinarily, flour will not deteriorate until after it has been kept for many months or more. Some wheats produce flours of better keeping qualities than do others. The soundness of the wheat, as freedom from rust, smut or other blemishes, influences the keeping qualities of flour as well as does also the process of milling, particularly the extent to which the cleaning and purification are perfected.

Wheat flour is not ordinarily adulterated, although at times attempts have been made to add other cereals and mineral adulterants. The national flour law requiring all mixed flours to be branded and to pay a slight revenue tax has prevented extensive adulteration. At one time, corn flour produced by milling corn was used for adulterating wheat flour. This, however, was only practised for a very short time when corn was cheap and wheat was high in price. The blending of wheat and corn flours has never proven succesful as an inferior bread product results, and the practice since the passing of the national flour law has been discontinued. Wheat flour appears to be less subject to adulteration than many other articles of food. See ADULTERATION.

Wheat flour is used not only for bread making but for other purposes. Crackers, cakes, pastry and many food articles are made largely of flour. Flour is also used in the arts and industries and in various manufacturing operations. The comparative value of bread made from different kinds of flour, as graham, entire wheat and straight, is discussed in the article BREAD AND BREAD MAKING.

As a conservation measure during the war with Germany, the United States Food Administration requested that 100 pounds of standard wheat should be milled so as to produce not less than 74¼ pounds of flour; the residue, about 25 pounds, consisted of wheat by-products, the flour milled in accord with the United States Food Administration regulations being designated 100 per cent flour; no separations in patent and clear grades being made. One hundred per cent flour, comprising all the flour separated from the wheat, is about a 75 per cent extraction (not less than 74¼), that is it represents about 75 per cent of the wheat milled. This flour should not be confused with 100 per cent extraction flour, which is a graham flour. The 100 per cent flour contains no bran or wheat by-products, while the 100 per cent extraction flour contains all the bran and by-products of the wheat. To make the short wheat crop of 1917 go as far as possible in bread-making, bakers were required to mix from 20 to 25 per cent of other flours as corn flour, barley flour or oat flour with the wheat flour used. By this and other means a large amount of wheat and flour was made available for export to other countries at war with Germany, and also to neutral countries.

It is estimated that four and a half bushels of wheat, equivalent to about 200 pounds of flour, are consumed annually per capita in the United States. More flour is consumed in the Northern than in the Southern States. The consumption of flour as food has, during recent years, gradually increased. Some political economists and scientists have feared that at no distant date the consumption of flour would exceed the production of wheat. But improved methods of agriculture and the opening up of large tracts of land suitable for wheat culture, as in northwestern Canada, render this improbable. From earliest times wheat and wheat flour have taken an important part in the dietary of man and there is every reason to believe that it will continue to be one of his staple articles of food. The extent to which it should be used in the dietary depends largely upon the individual and the cost of food. Ordinarily wheat flour is one of the cheapest articles of food and when it forms a part or even the main portion of a ration, it supplies a large amount of nutrients in a digestible form and at a low cost.

Production.— According to the special census of manufactures for the calendar year 1914 the production of wheat flour in the United States for that year totaled 116,045,090 barrels, valued at $542,051,752 — an increase of 9.7 per cent in quantity, but a decrease of 1.5 per cent in value, as compared with the figures for 1909. The amount of wheat consumed in making this product was 543,970,038 bushels, an increase of 9.6 per cent over that consumed in 1909. A large quantity of bran and middlings amounting to nearly 4,000,000 tons, and valued at nearly $100,000,000 was also turned out as a by-product, besides a large output of «offal,» used as stock feed. Exact figures were not reported for these products of the flour mills, the whole output for all grist mills being grouped. The totals may be found under the article FLOUR MILLING, AMERICAN.

HARRY SNYDER,
Of the Russell-Miller Milling Co.

FLOUR BEETLE, name given to several species of minute beetle which infest all sorts of manufactured cereals. Some species such as the *Tribolium ferrugineum* lay their eggs in cracks of barrels or containers. These beetles cause great losses in warehouses and mills. Painted barrels or containers are a great aid in keeping them out, but once well established in a place a thorough scalding is necessary to abate the pest.

FLOUR AND MEAL INSECTS. Various forms of small whitish caterpillars and darker-colored «worms» are commonly found in flour and meal and manufactured cereal products of different kinds. The most prominent of these is the Mediterranean flour moth (*Ephestia kuehniella*), which has been termed a veritable scourge in flouring-mills. It was practically unknown as a pest until 1877, and in North America is still limited to portions of California, Minnesota, New York and Pennsylvania, where flour-milling is an important industry. The moth has a wing-expanse of a little less than an inch, and is of a pale lead-gray color. The caterpillars are whitish, with long but inconspicuous hairs, and make the trouble while searching for a proper place for transforming to the pupa stage. Wherever it crawls it drags after it a large quantity of silk, with the result that flour becomes felted together and lumpy and the mill machinery gets clogged, requiring frequent and expensive stoppages. The entire life cycle of this insect may be accomplished in 38 days, hence in well-heated mills or other buildings inhabited by the insects from four to six generations may be produced. When a mill is found infested the entire building must usually be fumigated. Sometimes a whole district becomes overrun, and in this case great care must be observed that the insect does not spread from one mill to another. Various remedies are used for eradicating the pest, including the free use of bisulphid of carbon and hydrocyanic-acid gas, the use of «steam-sweepers» and «elevator brushes.»

The Indian-meal moth (*Plodia interpuncctella*) somewhat resembles the preceding, but is smaller; the outer halves of the fore-wings are dark greasy brown with metallic reflections, and the larva usually has a reddish or greenish tinge. It has the same habit of webbing up flour, but is not so great a pest as the Mediterranean flour-moth, possibly because it has a larger range of food material, feeding on nearly all forms of dried vegetable matter, among which are dried fruits and jellies, which have earned it the title of «pantry moth.» It is to be found in nearly every store and household, and particularly where dried vegetable foods are neglected for any length of time. The meal snout-moth (*Pyralis farinalis*) is rarer than the preceding, and seldom does injury to flour or meal, although it spoils clover hay.

Two species of beetles (*Tenebrio molitor* and *obscurus*) and their larvæ are popularly known as «meal-worms,» both in this country and abroad. The former is a shining brown beetle over half an inch long, and produces a yellow meal-worm; the latter is dull black, and produces a dark brown meal-worm. They are most apt to be troublesome in dark locations, in feed-stores and in stables; but are useful when raised under control, since they are salable as food for mocking-birds, nightingales and other cage birds.

Flour beetles or «weevils» are little flattened reddish beetles of the same family (*Tenebrionidæ*) as the meal-worms and are great pests in mills and storehouses. The chief source of annoyance from these insects is due to their imparting a highly offensive and persistent odor to the substances which they infest, which include various drugs, snuff, capsicum, ginger, dried peas and beans, baking powder, nuts and cabinets of dried insects. Several species occur in America. They differ somewhat in structure and in habits, but may be controlled by the use of bisulphid of carbon. See WEEVIL.

FLOUR MILLING, American. Flour milling is of two kinds; one the primitive, small industry that supplies a natural local demand; the other a commercial enterprise, which goes into the open markets for its raw material and disposes of its product in the markets of the world. One dates from the early settlement of the country, or as soon as wheat was grown in America; while the other had its beginning about the time of the Revolution, though it assumed no really great importance until after the middle of the last century. While the country has, and probably always will have, a large number of small mills situated in the rural districts, the flour-milling industry proper — considered commercially — is on a larger and more important scale than ever before. In fact, the special census of 1914 gives it fourth place among the manufactures of the United States in value of products following: (1) slaughtering and meat packing; (2) foundry and machine shop products; and (3) iron and steel products of steel works and rolling mills.

The small mill that supplies a purely local village or rural demand may properly be termed an «agricultural adjunct,» and, from this point of view, the history of farming in this country is the history of the grist-mill. Its early growth is of some interest. In 1626, a horse-power mill was built on Manhattan Island, and a windmill in New England, near Watertown, about two years later. Windmills soon became common on the Atlantic coast. The first water-mill in New England was probably built on the Dorchester side of the Neponset, in 1634. Before the middle of the century, New England was exporting wheat and flour to Portugal. In 1649, Virginia had four windmills, five water-mills and numerous horse-mills, and was also an exporter of wheat and flour. By 1678, New York had a number of mills, and, moreover, had a monopoly on the process of bolting flour.

For over 100 years the development of milling reflected the growth of the country, with some extension of trade in the West Indies and South America. Still, the processes were crude, and the industry, with few exceptions, had hardly gone beyond the agricultural or local basis. Not until the mills began to centralize, until «milling centres» began to form, did the industry shape itself on a commercial basis. The period commenced shortly after the Revolution. Yet milling then, as compared with to-day, was as the stage coach of 1776 compared with the luxurious express train of the present century. The mills of Delaware, however, were celebrated for their flour. This district on the Brandywine, had 130 mills within a radius of 40 miles, and Wilmington was an exporter of «superfine» flour.

The next milling centre of importance, and which later took first rank, was Baltimore. In 1787 the mills of that city made 325 barrels of flour daily, and it was there that the first marked improvements in the process of flour making were adopted. Up to 1785 the different stages of milling were separate and largely done by hand, as they are even to-day in the Hungarian process. But Oliver Evans introduced the elevator and conveyor, and combined the several steps into a continuous system; thus dispensing with much labor, and making a saving in the cost of production. Owing to the failure of the Delaware millers to adopt these improvements, Baltimore became the more important centre, and the Patapsco River, with its fine water power, became celebrated during the next 50 years. In 1840, the Patapsco, within 30 miles in which the fall is 800 feet, had 60 mills, which ground several hundred thousand barrels of flour a year. A considerable export trade was done with the West Indies.

Still another milling centre was formed at Richmond, Va., at the falls of the James River. The district is now not known as a milling point but in 1845, Richmond had the largest mills in the United States, the «Gallego» and the «Haxall.» The number of mills there was 21, and their trade besides the local and nearby territory, was with South America. The «Gallego» mills, in 1864, had 31 pairs of buhrs or millstones, with an annual capacity of 190,000 barrels of flour. The «Haxall» mills had a capacity of 160,000 barrels.

From the Atlantic coast the milling centre moved westward, following the wheat-growers. Rochester, N. Y., in the Genesee valley, was the next centre, and while it retained its importance for many years, it was surpassed eventually by newer districts farther west. At one time Cincinnati gained considerable importance as a milling point, but Saint Louis was destined to supplant Rochester as the great milling centre. While Rochester has lost its relative importance, Saint Louis has retained its mills, although Milwaukee has developed a slightly greater milling capacity than Saint Louis; but all have more recently been outclassed by Minneapolis. For many years, however, Rochester was recognized as the first milling city of the country, having as early as 1835 no less than 21 mills, with 95 run of stones. The flour from these mills was sold throughout the Atlantic Coast States. In 1865, the flour output of Rochester was 800,000 barrels.

With the development of the great central wheat States, mills were built wherever there was increased population. In 1840, Ohio, Kentucky, Indiana, Illinois and Michigan had a total of 1,200 mills, producing about 30 per cent of all the flour made in the country, yet very few of them belonged to the commercial class, such as those of the centres. The scattered country mills supplied the farming communities and the small towns, while the few larger mills and those of the centres supplied the large markets and the districts where wheat was not raised.

Saint Louis began as a milling point in 1840, with two small mills. The city, due to its location, was then the principal city in the West. By 1860, the Saint Louis mills were making 800,000 barrels of flour a year. In 1870 the output was over 1,000,000 barrels, and in 1880 over 2,000,000. Saint Louis led all other centres until 1881, when Minneapolis began its rapid development. Among the other important milling centres are Toledo, Buffalo, Detroit, Indianapolis, Chicago, Kansas City and Milwaukee, already mentioned.

A small, crude mill was built at the Falls of Saint Anthony, now Minneapolis, by a detachment of soldiers in 1823, but the first merchant-mill was erected in 1854. Flour was first shipped to the east from Minneapolis in 1859. In 1865, the city had six mills, with a total daily capacity of 800 barrels. It was not until 1878 that the total annual output reached 1,000,000 barrels, and the direct export shipments were about 100,000 barrels.

In tracing the movement of the milling centre, it may be of interest to investigate the causes that brought a large number of milling interests together. The importance of the first milling district, the Brandywine, in Delaware, was due principally to convenient wheat supplies. The Patapsco district owed its importance to fine water power, local wheat supplies, and water transportation, while Richmond would probably never have gained any prominence but for its water power, though its transportation facilities, down the James, enabled it to build up an export trade. The fine water power of the Genesee River, at Rochester, was a natural inducement for the miller to build there, while the rich agricultural valley gave an abundant supply of raw material. Then, too, the opening of the Erie Canal gave Rochester unexcelled transportation facilities to other markets. Until other conditions entered into the situation to affect it, Rochester was particularly favored. Saint Louis had no water power, but it had river transportation both for wheat and flour, and it was for years the principal distributing point for a vast territory. Milwaukee was a market for early wheat and was the lake outlet for the Northwest before Chicago became a shipping point of importance. It was thus that mills began to be built at Milwaukee, and its milling importance may be ascribed to its favored position on the lake.

The greatness of Minneapolis as a milling centre is due partly to the water power from the Mississippi River and partly to the position of the city, which is the gateway between the wheat fields and the markets, but it is also largely due to the quality of the wheat of Minnesota and the Dakotas, the greatest spring-wheat territory in the world. Lastly, the pre-eminence of Minneapolis as a milling centre is in large part due to the men of genius, who in the early days grasped the situation and made the name «Minneapolis» known the world over. Given all the other advantages,— geographical position, water power, and even the annual production near by of some 200,000,000 bushels of superb hard spring wheat,— yet without the business genius and enterprise that inspired the early Minneapolis millers, the city might never have been known as the greatest flour-milling centre in the world.

The number of mills in Minneapolis has not increased materially since 1884, although the capacity has more than trebled. This increase, without even the enlargement of any of the mill buildings, was due to improved and condensed machines. There are seven milling companies in Minneapolis, having 22 mills with a maximum daily capacity of 75,000 barrels of flour. The capacity of the individual mills is from 600 barrels daily to 15,000 barrels. The Pillsbury «A» mill, having the latter capacity, is the largest mill in the world. Four of the seven companies are small ones, having but one mill each. The mills of the three large companies have a maximum daily capacity of approximately 31,000, 27,500 and 18,000 barrels respectively. The greatest actual flour production for a single week was 443,800 barrels.

The present time may be called a commercial era in the flour-milling industry. The period from 1870 to 1900 might fittingly be termed the mechanical era, for during that time greater changes and improvements were made in the process than in all the 200 years preceding it. During the mechanical period, there was also the export era, when the building of new mills and the increasing output of old ones, together with the increase in wheat raising of the country, caused an over-production of flour, if domestic markets alone were depended upon. In fact, the increased output was to keep pace with the growing export trade. After reviewing the natural development of the milling industry, which up to 1870 was identical with the growth of the country, these three divisions,— the mechanical, the export and the commercial, — seem most important. Of the mechanical period it may be said that from its introduction in 1787, the milling system invented by Oliver Evans dominated the milling industry until about 1870. The millstones were set close together, so as to secure as much flour as possible with one grinding. There was a great deal of friction, and the resultant heat often brought about chemical changes which injured the color and taste of the flour and lowered its grade. This process, well adapted to the soft, starchy composition of winter wheat, was unsuccessful with the hard spring wheat rich in gluten, producing from the latter a dark-hued flour which brought a low price in the market. For this reason also spring wheat commanded a comparatively low price. In 1868 efforts began to remedy this condition by the invention of a middlings purifier, and this was successful in clearing the color and thus raising the market grade of spring wheat flour, and consequently of the grain from which it was made. At this stage of development interest was centered upon the Hungarian «high-milling» or gradual roller process of flour milling, and a delegation of American millers went to Europe to inspect that system. Its superiority was immediately recognized, and with several important and ingenious modifications the process was adopted by all the larger merchant mills of the country. The former millstones were replaced by chilled iron or porcelain rolls, and the gradual cracking, breaking and crushing of the grain was arranged to produce as large an amount of middlings as possible, where the old process made every effort to avoid them. For it had been found that out of the middlings came the high-grade «patent» flour with its large and valuable content of gluten. The roller mill was invented in the United States by John Stevens of Neenah, Wis., about 1870, but patents were not awarded to him until 1880. The merchant mills of the country generally acknowledged his rights by paying for the use of his inventions long after they were installed. In the roller mills of the present day there are five reductions of the grain and six separations of the middlings before the actual grinding into flour. The product consists of 61.5 per cent of «patent» flour; 9.2 per cent of baker's flour; 3.7 per cent of «low grade» flour; 2.4 per cent of «red dog»; and 23.5 per cent of «offal,» which includes the bran and shorts.

Like the development of milling in this country, the export flour business was not placed upon a high commercial basis until the Minneapolis millers, in the early eighties, began a systematic campaign. From that time until 1900, the export trade increased steadily. Since then some adverse factors have arisen. The early mills of the Atlantic coast, as already mentioned, were the first to export flour, probably to meet an actual demand because these mills were the most convenient to buy from, rather than to supply a trade that had been built up by the mills. The early export business doubtless came of itself — a natural demand. The uncertain export flour trade of the first part of the last century reached its climax in the 40's, and then, when competition of European mills was felt, dropped off markedly, about the year 1850. During the next 25 years large amounts of wheat were exported annually, while the percentage of the flour production that was sent out of the country was small. The flour trade with the United Kingdom which is now an important part of the export flour business of this country, fell almost entirely away by 1865. This, perhaps, was because the American millers could not hold their own on even terms against the foreign millers, who were then becoming more progressive than ever before. The building up of the export flour trade, beginning with about 1875, makes an interesting chapter of commercial history.

The statistics of the flour milling industry in the United States, gathered by the census of manufactures for 1914, include only those mills which do merchant grinding as distinguished from those which do strictly custom work. Some mills which do both are included in the reports. The decrease of the number of establishments in the milling industry since the 1909 census is due partly to the general depression existing in 1914, and in part to the fact that a number of grain elevators discontinued their former milling work. Besides these reasons, another appears in the fact that several mills which had been doing both custom and merchant grinding discontinued the latter business, and thus dropped out of the census tabulation.

As reported, the number of establishments engaged in merchant milling in the United States in 1914 was 10,788 (11,691 in 1909). The number of persons engaged in the industry was 65,635 (66,054 in 1909), of whom 39,718 (39,453 in 1909) were wage-earners, receiving $24,593,162 annually in wages ($21,464,386 in 1909). The capital employed was $380,257,420 ($349,151,779 in 1909). The amount of grain ground was 818,929,321 bushels (806,247,961 bushels in 1909), and the value of the product was $877,679,709 ($883,584,405 in 1909). The cost of materials was $752,270,021 ($767,576,479 in 1909), the value added by manufacture being $125,409,688 ($116,007,926 in 1909). An additional output properly to be credited to the milling industry is that of 40 establishments engaged primarily in other industries but which manufactured gristmill products valued at $9,046,499. A large quantity of grain was used also by establishments whose products are known as “breakfast foods,” but which the census classifies as “Food Preparations.” Besides these, the manufacturers of starch and glucose ground about 44,000,000 bushels of corn.

Of the total quantity of grain ground by the milling industry proper in 1914, 545,728,431 bushels were wheat; 180,115,704 bushels were corn; 50,227,050 bushels were oats; 20,288,396 bushels were barley; 12,813,831 bushels were rye; 5,478,045 bushels were buckwheat; and 4,277,864 bushels were of other grains. The production of wheat flour totaled 116,403,770 barrels, valued at $543,839,508 — showing an increase of 11.9 per cent in production over the 1909 figures, but a decrease in value of 1.1 per cent. The figures include 573,979 barrels of graham flour. Of rye flour and rye graham, 1,937,385 barrels were made; in value, $7,845,213 — an increase of 25.8 per cent since 1909. Of corn meal and corn flour, the production was 16,327,993 barrels, valued at $54,963,301 — a falling off of 24.2 per cent from the production of 1909. The production of buckwheat flour amounted to 125,622,189 pounds (value, $3,754,857); and of barley meal, 14,000,789 pounds (value, $242,343) — a decrease of 28.7 per cent in the former and of 51 per cent in the latter from the respective productions of 1909. In connection with the other flouring-mill products there were reported the manufacture of 870,364,453 pounds of hominy and grits (value $13,767,561); and 30,451,581 pounds of oatmeal (value $757,804); and 92,676,085 pounds of various cereal “breakfast foods,” valued at $2,932,238. Miscellaneous cereal products totaled a value of $2,091,922. As by-products the flour mills produced 4,666,534 tons of bran and middlings valued at $104,702,735, and 4,753,280 tons of feed and offal valued at $137,067,959; besides 301,949 gallons of corn oil, worth $152,208, and “other mill products” valued at $5,562,000.

In the 1914 census flour mills and gristmills were reported for every State in the Union and for the District of Columbia. In some of the States the mills are still operated by waterpower and equipped with buhrstones. These mills reported 2,905 runs of stone for 1914 as against 10,609 runs in 1909, the change being due to the fact that the steel attrition mill is replacing the buhrstone. The equipment of the mills reporting for 1914 consisted of 42,841 stands of rolls, 7,704 runs of stone, and 6,793 attrition mills or steel grinders, including steel buhr mills.

The following table gives the output of the several States arranged in the order of their relative importance in the milling industry, the number of mills in each, and the value of their 1914 production:

Minnesota, 286 mills	$148,243,708
New York, 891 mills	77,408,764
Kansas, 360 mills	72,894,736
Illinois, 406 mills	49,493,224
Ohio, 649 mills	45,171,200
Pennsylvania, 1,265 mills	43,626,356
Missouri, 641 mills	38,686,309
Indiana, 512 mills	37,488,223
Texas, 191 mills	35,110,301
Wisconsin, 252 mills	28,697,413
Michigan, 427 mills	27,381,474
Tennessee, 512 mills	26,413,574
California, 132 mills	24,078,735
Washington, 100 mills	23,665,382
Kentucky, 442 mills	21,229,203
Virginia, 533 mills	18,084,413
Oklahoma, 253 mills	16,688,690
Nebraska, 211 mills	15,022,126
Iowa, 227 mills	14,336,576
North Dakota, 59 mills	12,029,905
Oregon, 95 mills	11,192,573
North Carolina, 293 mills	8,963,501
Maryland, 247 mills	8,163,869
Colorado, 83 mills	7,535,633
West Virginia, 229 mills	7,052,814
Georgia, 128 mills	6,083,760
Arkansas, 102 mills	5,802,099
South Dakota, 72 mills	5,556,996
Montana, 33 mills	4,890,275
Maine, 148 mills	4,425,824
New Jersey, 196 mills	4,320,424
Vermont, 125 mills	4,142,854
Massachusetts, 105 mills	3,811,377
Idaho, 71 mills	3,395,942
Utah, 70 mills	3,155,513
New Hampshire, 79 mills	2,733,820
Alabama, 73 mills	2,179,165
Connecticut, 85 mills	1,881,481
Delaware, 60 mills	1,483,410
Arizona, 8 mills	1,064,996
Rhode Island, 20 mills	797,553
Wyoming, 16 mills	721,818
Louisiana, 7 mills	687,387
New Mexico, 17 mills	424,501
South Carolina, 37 mills	420,629
Mississippi, 17 mills	410,332
Nevada, 7 mills	386,566
Florida, 13 mills	166,237
District of Columbia, 3 mills	78,048

The census shows a tendency of the milling industry to concentrate in large establishments under the control of corporations. Of the whole number of 10,788 mills reported, 153 manufactured products valued at $1,000,000 or over, and these made 42.9 per cent of the total production of the entire number, 21 per cent were controlled by corporations which made 73.5 per cent of the entire output, and employed

63.5 per cent of all the wage-earners engaged in the industry. In 1,887 mills there were no wage-earners; the business was carried on by the proprietor. In 7,067 establishments there were not more than five wage-earners. In but 19 establishments were there upwards of 100 wage-earners.

The horsepower employed in the industry totaled 822,384. Of this, 403,186 was generated by steam engines; 112,441 by electricity; 229,328 by waterpower; and 77,429 by internal combustion engines.

Of the 10,788 establishments making flour mill and grist-mill products in 1914, there were 3,912 which did not grind wheat flour, leaving 6,876 mills which did produce that commodity,— a figure 809 less than in 1909.

In the production of wheat flour in 1914 the States producing the largest number of barrels with the value of this output were as follows:

Minnesota, 27,132,155 bbls	$117,988,654
Kansas, 12,777,582 bbls	56,514,360
New York, 8,522,011 bbls	40,798,737
Illinois, 6,643,983 bbls	31,904,077
Ohio, 5,707,781 bbls	27,852,222
Missouri, 5,402,391 bbls	25,633,116
Indiana, 4,526,879 bbls	21,183,688
Texas, 4,089,378 bbls	21,805,623
Pennsylvania, 3,975,031 bbls	19,795,116
Washington, 3,765,070 bbls	15,685,353
Tennessee, 3,093,197 bbls	15,620,227
Wisconsin, 3,056,954 bbls	13,817,821
Michigan, 3,056,744 bbls	16,056,043
Kentucky, 2,728,464 bbls	13,880,767
Nebraska, 2,383,097 bbls	10,944,855
North Dakota, 2,165,078 bbls	9,864,400
Virginia, 2,161,767 bbls	10,702,588
Oklahoma, 2,072,240 bbls	9,832,201
Oregon, 1,791,334 bbls	7,749,619
California, 1,783,007 bbls	10,341,920
Iowa, 1,488,811 bbls	7,149,334
Colorado, 1,229,225 bbls	4,923,302
Maryland, 1,105,577 bbls	5,152,538
North Carolina, 951,805 bbls	5,231,853
South Dakota, 920,070 bbls	4,458,144
Montana, 871,918 bbls	3,919,318
Idaho, 571,965 bbls	2,261,403
West Virginia, 520,940 bbls	2,732,789
Utah, 505,224 bbls	2,242,417

No other State made as many as 500,000 barrels.

The great corn milling States were Tennessee, 1,601,607 barrels; New York, 1,470,365 barrels; Virginia, 1,099,215 barrels; and Texas, 1,042,654 barrels. The largest output of rye flour came from Minnesota, 579,648 barrels; and Wisconsin, 501,475 barrels. The largest production of hominy and grits came from Indiana, 292,131,101 pounds; Illinois, 154,209,222 pounds; and Wisconsin, 94,955,277 pounds.

The number of mills grinding only feed for live-stock was 2,940. These mills consumed 53,507,330 bushels of corn; 23,050,719 bushels of oats; and 17,687,860 bushels of other grain. The feed produced amounted to 2,287,127 tons, valued at $74,800,863.

With the entrance of the United States into the war it became necessary to adjust the wheat supply equitably among the Allies, and to spare from the United States crop an unusual amount for export, substituting the flour of other grains for a part of the normal consumption of wheat flour. This condition already prevailed in other countries, and had been met in part by milling a larger percentage of the grain into fine flour than had been the custom. In Great Britain it was required that 81 per cent of the wheat be returned in flour; an admixture of from 5 to 15 per cent of other grain — rye, rice, corn, oats, barley, or beans — being permitted, and in many instances quite essential to bring the required percentage. In France, 80 per cent was the requirement; in Germany, 94 per cent for wheat, and 80 per cent for rye; in Austria, 85 per cent for wheat and 82 per cent for rye. In the United States the requirement was 80 per cent for wheat and 66 per cent for rye. In Great Britain the attempt was made to grind wheat and corn together, which proved at first a failure owing to the moisture content of the corn germ, always removed by American millers. The American mills adhered strictly to grinding the different grains separately, and produced their mixed flours by mixing the flours of the separate grains.

The greatest commercial problem before the milling industry is that of competition, but this is no longer a problem of individuals, but of nations. It is first a competition for the raw materials, and then for the flour trade. Europe buys immense quantities of American wheat (259,642,533 bushels in the fiscal year 1914–15), and with the flour made therefrom enters the world's markets against American flour. The American miller will not feel that all his problems have been solved until the surplus of the wheat crop of the United States is no longer exported as raw material, but as manufactured flour. See FLOUR, WHEAT. Consult Amos, P. A., 'Processes of Flour Manufacture' (London 1912); Millers' Almanack and Trade Year Book, 1915–16 (Minneapolis 1915); Oliver, C. E., 'The Miller and Milling Engineer' (Indianapolis 1913) and the reports of the 1914 Census of Manufactures (Washington 1917).

FLOURENS, floo'räṅ', **Gustave**, French revolutionist and author: b. Paris, 4 Aug. 1838; d. Rueil, 3 April 1871. In 1863 he delivered at the Collège de France a course of lectures on the history of mankind. The theories advocated by him in these lectures gave offense to the clergy and he was hindered from further lecturing. He went to Belgium, where he published his lectures under the title 'Histoire de l'homme' (1863). He also traveled in the Near East, visiting Constantinople and Athens, took part in the Cretan revolution of 1866. An article of his in the *Popolo d'Italia* caused his imprisonment, and soon after his return to France he fought a duel with Paul de Cassagnac, editor of *Le Pays*. Flourens was an ardent republican and in February 1870 attempted a revolution at Belleville, but was obliged to flee to England. He returned to Paris on the downfall of the Empire, but was imprisoned by the provisional government. In January 1871 his followers effected his release and in March he joined the Communists by whom he was made colonel. He became an active leader and lost his life in a hand to hand conflict with the Versailles troops.

FLOURENS, Léopold Emile, French statesman: b. Paris 1841. In 1863–68 he served as auditor of the Imperial Council. In 1879 he became head of a department under the Minister of Education. Six years later he became chief of the divisions of Foreign Affairs, Justice and Legislation in the Council of State and also chief of a department in the Ministry of Foreign Affairs. He was appointed Minister of Foreign Affairs in 1886 under Goblet, and remained in this relation under the successive premierships of Rouvier and Tirard until 1888, when he became one of the moderate Republican party in the Chambre des Deputés. He secured re-election in 1889 and 1893, failed of election in 1898, but was again elected in 1902. His published works include ‘Organisation judiciaire et administrative de la France et de la Belgique de 1814 à 1875’ (1875) and ‘Alexandre III; sa vie et son œuvre’ (1893).

FLOURENS, Marie Jean Pierre, French physician and physiologist: b. Maureilhan, department Hérault, 15 April 1794; d. Montgeron, near Paris, 6 Dec. 1867. His first scientific writings, which were distinguished by their perspicuous style and analytical precision, appeared in 1819. In 1828 he was elected a member of the Academy of Sciences, in 1830 was appointed to the chair of comparative anatomy at the Jardin des Plantes, and in 1833 succeeded Dulong as permanent secretary to the Academy of Sciences. In 1840 he was admitted a member of the French Academy. In 1846 he was created by Louis Philippe a peer of France, he was deprived of this dignity by the revolution of 1848. Flourens combined with profound scientific knowledge great literary talent. His works are very numerous, but the following may be mentioned particularly: ‘Recherches expérimentales sur les Propriétés et les Fonctions du Système nerveux’ (1824); ‘Expériences sur le Système nerveux’ (1825); ‘Developpement des Os’ (1842); ‘Anatomie de la Peau’ (1843); ‘Mémoires d'Anatomie et de Physiologie comparées’ (1844); ‘Buffon’ (1844); ‘De l'Instinct et de l'Intelligence des Animaux’ (1841); ‘De la Longevité’ (1854); ‘De la Vie et de l'Intelligence’ (1858); ‘Œuvres de Buffon’ (1853–55); ‘Des Manuscrits de Buffon’ (1859); ‘Eloges historiques’ (1857). Flourens was the first to demonstrate experimentally that the substance of the animal body undergoes a constant process of renewal.

FLOWAGE. See ROCK-FLOWAGE.

FLOWER, Benjamin Orange, American editor and author: b. Albion, Ill., 19 Oct. 1858. He was the publisher and editor of the *Arena* at Boston until 1896; from 1904 to 1909 had charge of the *Coming Age,* which was finally combined with the *Arena;* and from 1909 to 1911 was editor of the *Twentieth Century Magazine.* Among his numerous works are ‘Civilization's Inferno; or Studies in the Social Cellar’ (1893); ‘The New Time’ (1894); ‘Gerald Massey: Poet, Prophet and Mystic’ (1895); ‘The Century of Sir Thomas More’ (1896); ‘Lessons Learned from Other Lives’; ‘Persons, Places and Ideas’ (1896); ‘How England Averted a Revolution of Force’ (1901; new ed., 1911); Christian Science as a Religious Belief’ (1910); ‘Progressive Men, Women and Movements of the Past Twenty-five Years’ (1914).

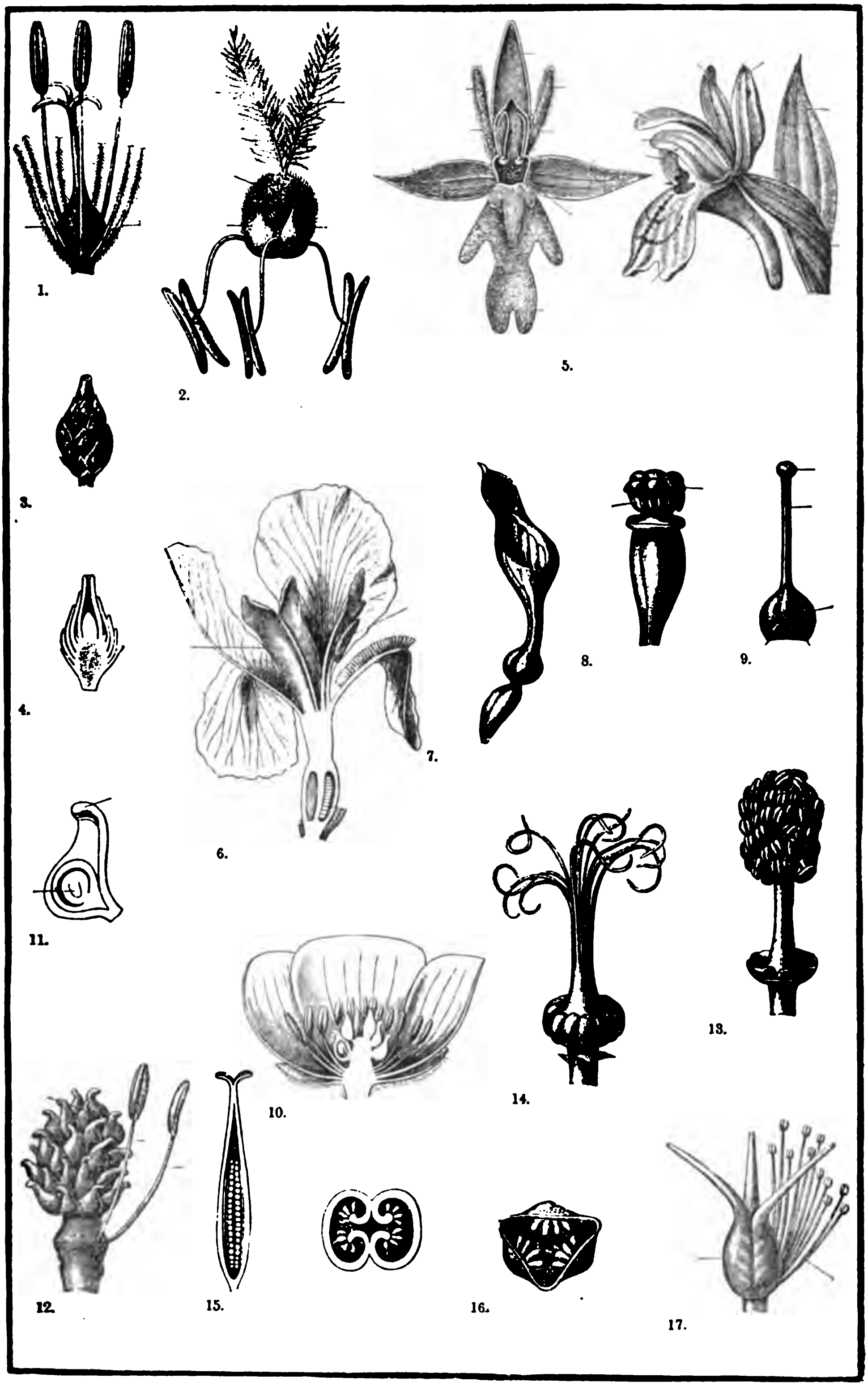
FLOWER, Roswell Pettibone, American financier: b. Jefferson County, N. Y., 7 Aug. 1835; d. Eastport, Long Island, 12 May 1899. He began his business and political career in Watertown, N. Y., where he organized the Jefferson County Democratic Club. His success in politics attracted the attention of Samuel J. Tilden, through whose influence he was appointed chairman of the Democratic State Committee in 1877. Four years later he was elected to Congress and in 1886 was appointed president of the Subway Commission. He was re-elected to Congress in 1888 and 1890 and in 1891 was elected governor of New York. From the close of his term till his death he applied himself to the interests of his large banking house and to a systematic course of philanthropy. A statue in his memory by Saint-Gaudens was placed in Watertown in 1902.

FLOWER, SIR William Henry, English zoologist: b. Stratford-on-Avon, 30 Nov. 1831; d. London, 1 July 1899. After a medical training he served as an assistant-surgeon in the English army during the Crimean War; in 1861 was conservator, and from 1870–84 Hunterian professor of comparative anatomy in the Royal College of Surgeons. From 1884–98 he was director of the natural history departments of the British Museum. He was president of the Zoologist Society 1879–99, of the Anthropological Institute 1883–85 and of the British Association in 1889. He was made a knight commander of the Bath in 1892. He rendered distinguished service by his admirable classifications and in the realm of discovery elucidated many new facts about the anatomy of mammalia and was the first to demonstrate that the dentition of the marsupial remains throughout life unchanged with the exception of a single tooth. Several important treatises came from his pen, including ‘Introduction to the Osteology of the Mammalia’ (1870; 3d ed. 1885); ‘Fashion in Deformity’ (1881); ‘The Horse’ (1890); and ‘Essays on Museums and other Subjects’ (1898).

FLOWER, that portion of the anthophytous plant which consists of the organs of sexual reproduction, with the accompanying envelopes, if present. Popularly this term is applied only when one or both sets of floral envelopes are conspicuous, or even to showy groups of flowers. The flower consists of an axis, frequently very much shortened or otherwise modified, called the torus. From this there arise typically, in basipetal succession, the pistil (or pistils), stamens, petals and sepals. In many types of flowers, however, one or more of these sets of organs may be lacking. Production of seeds follows the application of pollen, produced by the stamens, to the pistil, within which the seed or seeds are developed.

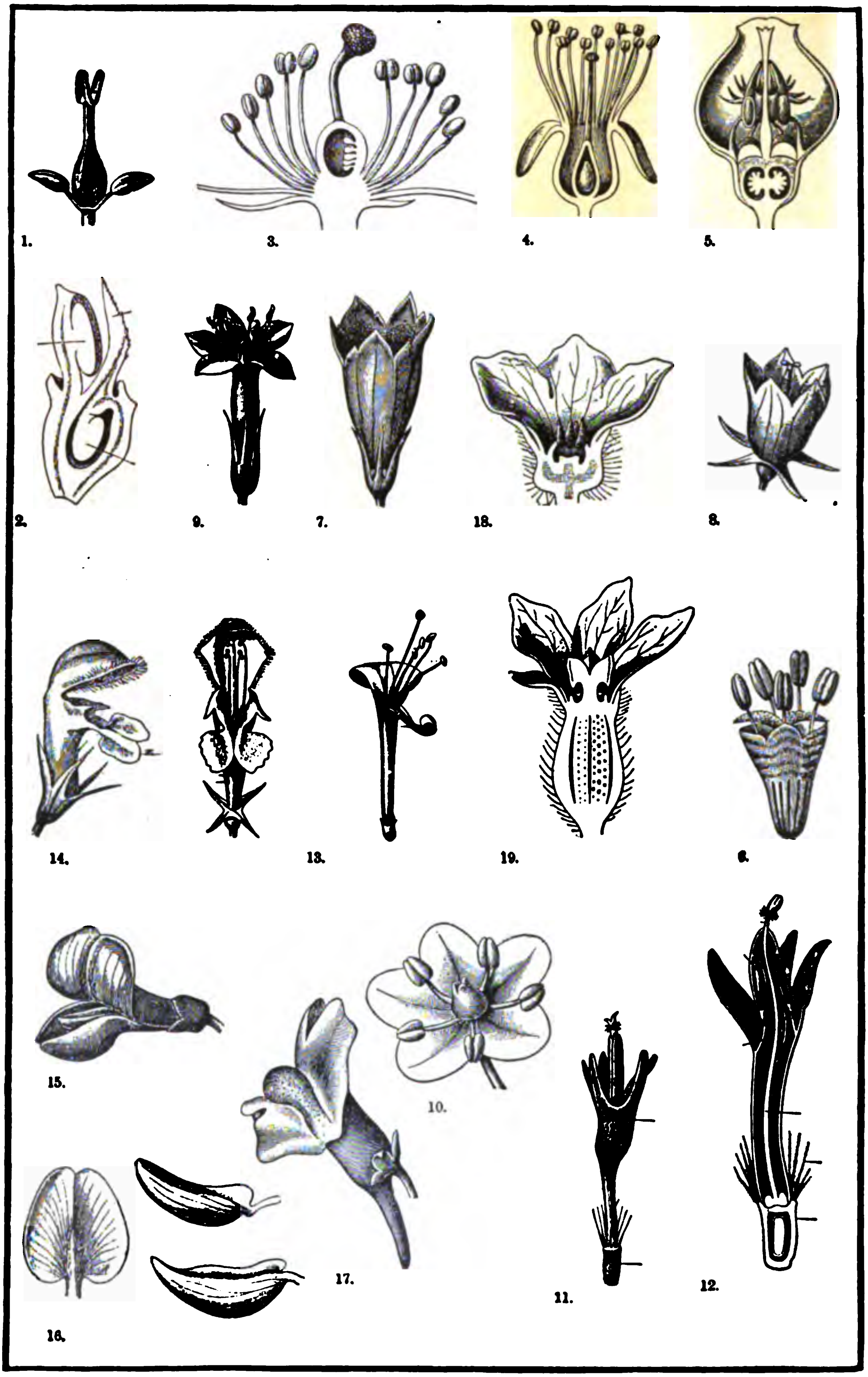
Detailed Anatomy.— The pistil may be simple, i.e., consisting of but one megasporophyll (carpel), in which case the number of pistils in the flower may be more than one, or compound, i.e., consisting of two or more partially or completely united megasporophylls. Except in monstrosities never more than one compound pistil occurs in a flower. The pistil usually shows two or three fairly well marked portions, the ovary, style and stigma, the second often being absent. The ovary is the enlarged basal portion of the pistil and is hollow, containing the ovule or ovules; the stigma is a specially modified region, usually apical or nearly so, to which the pollen grains adhere and find suitable conditions for their germination leading to the fertilization of the ovules; the style is the slender, elongated upper portion of the pistil situated, when present, between the ovary and the stigma, thus raising the latter up, away from the ovary. The ovary may possess one cavity or locule («one-celled» ovary) or several. The latter case occurs only when the

MORPHOLOGY OF FLOWERS



1 Bulrush flower with perianth reduced to bristles
2 Grass flower showing two petals (lodicules)
3, 4 Female cone of Yew
5 Orchid flowers
6 Iris
7 Aristolochia
8 Flower of Aristolochia with calyx cut away
9 A single pistil
10 Section of Ranunculus flower
11 A single carpel of Ranunculus
12 Gynoecium of Ranunculus
13 Androecium of Mallow with united filaments
14 Compound pistil of Mallow with styles united at base
15 Ovary of Gentian with two united carpels
16 Ovary of Violet with three united carpels
17 Gynoeceum of Hypericum with a part of the stamens

MORPHOLOGY OF FLOWERS



1 Flower of European ash
2 Section of flower of H.ppuris
3 Hypogynous flower (rock-rose)
4 Perigynous flower (cherry)
5 Epigynous flower (whortleberry)
6 Flower of English elm
7 Funnel-shaped flower of Gentian
8 Bell-shaped flower of Harebell
9 Salver-shaped flower of Gentian
10 Rotiform corolla
11 Tubular corolla (bluebottle)
12 Section of bluebottle flower
13 Two-lobed flower
14 Labiate flower
15 Papilionaceous corolla
16 Parts of a papilionaceous corolla
17 Personate corolla (spurred)
18 Male (staminate) flower (melon)
19 Female (pistillate) flower (melon)

pistil is compound. The stigma and style may be single or several in number. A single style may possess several stigmas. The ovules may be numerous or but one and attached at various points on the interior of the ovary. These regions of attachment are called placentæ. The megasporophylls are open in the very young flower buds but gradually fold together and unite by the time of opening of the flower. The ovules are attached at the united edges. In a simple pistil the ovary has but a single cavity and the ovules are attached to only one placenta, the style is single and the stigma also. In a compound pistil the component megasporophylls may be closed, as in simple pistils and then united by their adjacent outer faces, forming a pistil with as many locules as there are carpels, with the ovules in the central angles (*placenta axillary*), e.g., lily, or they are joined edge to edge, forming a one-loculed ovary with as many placentæ against the outer wall as there are component megasporophylls (*parietal placentæ*), e.g., violet. In the Pink family the placenta is axial, as in the lily, but the thin septa are dissolved early in the growth of the pistil, so that the placenta seems to have arisen free in the centre of the ovular cavity (*free central placenta*). The ovules are the future seeds. They consist of a central body, called the nucellus, in reality a sporangium (*megasporangium*) surrounded by one or two protective coats (*integuments*), which enclose the nucellus entirely, except for a small apical opening (*micropyle*). The ovule may be sessile or provided with a short or long stalk (*funiculus*). It may be straight or bent back upon the funiculus or curved. It may arise from the bottom of the ovary (basal), or from the sides, or may hang from the top (suspended). Within the nucellus are produced typically four spores (*megaspores*), one of which develops into a rudimentary female plantlet (*gametophyte*), the so-called embryo sac, entirely enclosed within the ovule. Within this is produced a single egg. The pollen grain (*microspore*) germinating upon the stigma produces a long tube containing several cells (representing a small male plantlet or gametophyte) which grows down through the style into the cavity of the ovary and enters the ovule through the micropyle (rarely through the funicular or "chalazal" end). On reaching the embryo sac a sperm nucleus is set free which fertilizes the egg. The latter now grows and divides, producing the embryo plant for the new generation. This is at first nourished by the embryo sac which may develop into a considerable mass of tissue (*endosperm*), taking its nourishment in turn from the tissues of the ovule. As the seed matures this endosperm may be all consumed or part of it may remain, resulting in respectively exalbuminous or albuminous seeds.

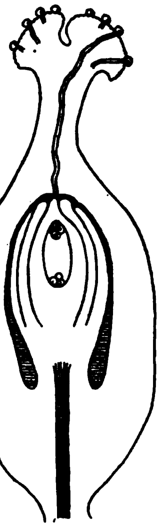


FIG. 1.—Pistil of wild buckwheat in longitudinal section.

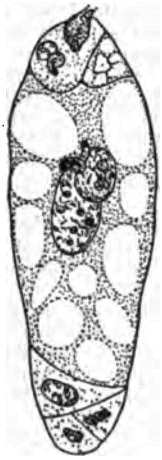


FIG. 2.—Female gametophyte (embryosac) showing fertilization.

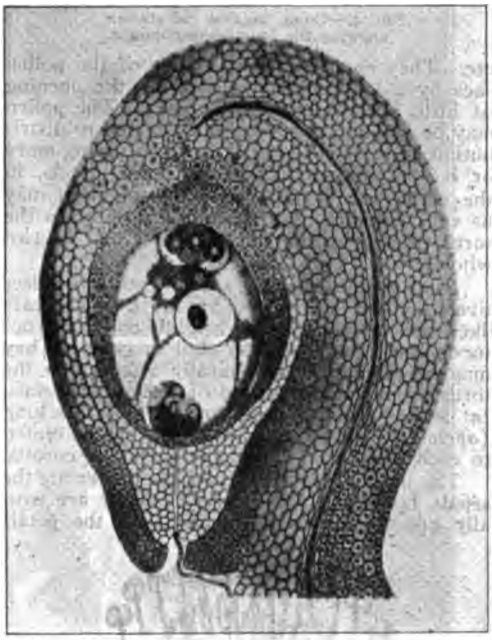


FIG. 3.—Embryo Sac.

The integuments of the ovule become the seed coats.

The stamens have their position next below the pistils on the torus. Technically a stamen is a microsporophyll and consists of a stalk (filament) and an enlarged extremity (anther). The anther consists of a usually narrow portion (connective) bearing on each side two microsporangia or pollen sacs. Within these are produced the microspores or pollen, consisting of round or angular, sometimes elongated, usually yellow or orange, less often green cells. These are smooth or marked in characteristic patterns by ridges, spines, pits, etc. They escape by the rupture of the pollen sacs by a longitudinal split or by the opening of little lids, usually at the apex. The pollen may be dry and dust-like and adapted to distribution by the wind or sticky and occurring more or less in masses, depending upon insects, in the main, for distribution. The stamens may be very numerous and arranged spirally on the torus or few in number, forming one or two whorls.

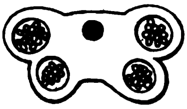


FIG. 4.—Cross section of stamen showing the four microsporangia.

Next to the stamens are the petals (collectively the corolla). These are more or less leaf-like, thin, mostly white or brightly colored structures, less often green or dull in color. They may be numerous and spirally attached to the torus or in a single whorl of but a few petals. In some flowers they are entirely lacking (*apetaly*). The petals of a flower may be united to each other to form a gamopetalous corolla.

The outermost members of the flower are the sepals (collectively the calyx). They are usually green and more leaf-like than the petals and form the outer layer of the flower bud, enclosing the other parts. They may be numerous and spirally arranged or few and in a whorl. In the absence of the petals the sepals of some kinds of flowers are brightly colored, as in the anemone, four-o-clock, buckwheat, etc. Like the petals the sepals may be separate or united. In some flowers the calyx also is lacking, in which case the flower is called naked or achlamydeous.

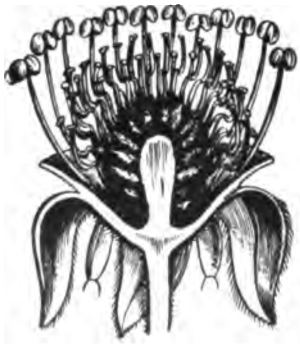


FIG. 5.—Longitudinal section of flower of Geum, with petals removed, showing elongated torus and beginning of perigyny.

The torus may be more or less elongated, so that the pistil or pistils, stamens, petals and sepals follow one another downward, e.g., buttercup or magnolia, or flattened so that the pistil is in the centre with the other organs successively further from the centre, e.g., pink, or it may be saucer- or cup-shaped bearing the pistil or pistils in the centre and the stamens, petals and sepals on the rim of the cup, e.g., plum and rose. Flowers of the last type are called perigynous and of the first two hypogynous. A still further modification is that where the hollowed out torus is grown fast to the enclosed pistil so that the remaining organs of the flower appear to arise from the top of the ovary (epigynous flower), e.g., apple, evening primrose, etc.

Variations in Structure and Arrangement. — In general the flowers of the Monocotyledoneæ have their parts in threes, those of the Dicotyledoneæ in fives or fours, with numerous exceptions in both groups. Probably the majority of the former group possess pentacyclic flowers, i.e., with five whorls, sepals, petals, stamens (two whorls) and carpels (usually united into a compound pistil). The members of each whorl alternate in position with those of the next whorl, so that the petals stand opposite the stamens of the inner whorl and alternate with those of the outer whorl as well as with the sepals. Since the number three prevails largely throughout this class it is apparent that where but two or only one member is present the others have been lost in some way, leaving a gap. In the Dicotyledoneæ many flowers are spiral in their arrangement, others have their sepals and petals in alternating whorls of five each with numerous stamens and pistils; the most, however, possess a pentacyclic or even more frequently a tetracyclic type of flower. In the latter case it is usually the inner whorl of stamens that is missing; in the Primroses, however, the outer whorl. There is also a great tendency toward the reduction of the carpellary whorl to three or even two carpels, the other whorls remaining in fives. It is true that in the Mints and Foxgloves (respectively *Lamiaceæ* and *Scrophulariaceæ*) we frequently find but four or even two stamens while the petals and sepals remain in fives. In these cases we can see the gaps left by the missing stamens and reconstruct it as an incomplete whorl of five. In these same flowers the carpels are but two.

The petals and sepals may be entirely free from each other in the same whorl or their bases may be united, leaving the remainder free, as with the corolla in Old-Man's-Beard (*Chionanthus*), or the union may be practically complete, as in the corolla of Morningglory (*Ipomœa*). Various other unions may be found in parts of flowers. Thus in the pea family (*Fabaceæ*) very commonly the filaments of nine of the stamens are united into a tube which is open at one side, the tenth stamen standing in this opening but not united to the others. In the Composites (*Asteraceæ*, etc.), the anthers of the five stamens are united into a ring around the stigmas, the filaments remaining free. In a great many gamopetalous flowers and some others the filaments are grown fast

FLOWERS

1 Poppy (Papaver somnifera)
2 Peony (Pæonia arborea)

3 Primrose (white Chinese variety)
4 Italian Petunia

to the inner face of the corolla so that the stamens seem to have their origin from this instead of from the torus. In the Orchids (*Orchidaceæ*) the two (or one) stamens are united with the style to form the peculiar structure called the column.

The simplification of the flower by the reduction in the number of parts may be very great. In some species of maples the flowers have showy petals and large sepals; in other species the petals are lacking and the sepals rather small; in still others the sepals are minute. The elm flower lacks petals but has rudimentary sepals; the flowers of the spurge (*Euphorbia*) lack both petals and sepals. Indeed the latter are the simplest flowers known, consisting respectively of a single stamen or a single pistil for the male or female flower. That this is not the simplicity of primitiveness is shown by the fact that the pistil is compound and that the near relatives within the same family show all degrees of reduction from flowers with all parts, those without petals and those with sepals missing also. Along with such reduction of parts often goes the segregation of sexes into different flowers on the same plant (*monœcious plant*) or upon different plants (*diœcious plants*).

As flowers are reduced to greater and greater simplicity we find that there is a tendency toward being more and more crowded together, e.g., catkins of willow and birch, or very much more numerous, e.g., grasses, elm, maple, etc. This reduction in complexity of structure and increase in numbers often goes hand in hand with the loss of insect pollination (*entomophily*) and the acquirement of *anemophily* (pollination by air borne pollen).

Flowers may be single on long or short stalks or in various types of clusters. (See Inflorescense). Frequently they are associated with modified leaves, called bracts. These are sometimes brilliantly colored, adding to the conspicuousness of the cluster. Sometimes the flowers themselves are inconspicuous and only the bracts are showy. Such is the case with the cultivated Poinsettia, Snow-on-the-Mountain, etc.

Pollination.— Especial interest attaches to those modifications of floral structure which provide for pollination or prevent self-pollination while favoring cross-pollination. Those modifications that provide for pollination by means of insects are discussed more fully in the article Flowers and Insects.

It was shown by Darwin that some flowers are infertile or only partially fertile when pollenized with their own pollen; on the other hand plants like wheat, bean, pea, etc., are regularly fertilized within the bud before the flower opens, by their own pollen without any discoverable loss of fertility or vitality. Many flowers have contrivances which prevent self-pollination. Thus the stigma may be receptive at a different time from that when the pollen is being shed. In this regard the flower may be proterogynous, with the pistil receptive before the pollen is set free, or proterandrous, in which case the pollen has all been shed before the stigma is receptive; the plantain being an example of the former, a comparatively rare condition, the proterandrous flowers being very numerous.

Certain plants, such as the violet, jewel weed (*Impatiens*), etc., have two kinds of flowers, the showy ones which are visited by insects and cross pollinated, and which may or may not produce seeds, and the so-called cleistogamous flowers, which remain small, are rudimentary in structure (petals often lacking), and do not open, pollination taking place within the unopened flower by the setting free of the pollen from the anthers so that it comes into direct contact with the stigmas. In some plants it is only the cleistogamous flowers that produce seeds. For a number of cases it has been demonstrated that the production of one or the other kind of flower depends upon the nutrition of the plant.

Evolution of the Flower.— The old idea that the flower represents a modification of a leafy shoot, with the sepals, petals, stamens and pistils as successively further and further deviations from the leaf structure has been abandoned since it is clear that the reproductive leaf (*sporophyll*) is probably older in the evolutionary history of the vegetable kingdom than the strictly vegetative leaf. In most ferns the leaves serve a dual purpose, that of reproduction (by producing spores) and of food manufacture. As we advance along the line of evolutionary development we find that there is a progressive sterilization of part of these leaves until the reproductive function is confined to only a few leaves (*sporophylls*), the remainder of the leaves having lost the capacity to produce spores and being the vegetative leaves. These sporophylls may resemble the vegetative leaves in being able to manufacture food, and in that case usually differ from them very little in appearance. However, once the cleavage has appeared we find that it progresses until they are very different, even in some groups not very far advanced. Along with this differentiation there occurred a segregation of the sporophylls from the vegetative leaves; thus in the ostrich fern the vegetative leaves are produced earlier in the season and the sporphylls in a cluster in the centre toward the season's close. In some of the extinct forms that are on the path toward the higher plants (*Bennettitales*) the sporophylls are of two kinds, producing respectively megaphores (female spores and microspores (male spores) on the megasporophylls which are crowded together at the apex of a modified shoot, below which the microsporophylls occur, also in large numbers, the whole being subtended by several large protective leaves. This type of flower is so suggestive of the flower of Magnolia that many botanists now see in the latter the most primitive type of the modern Anthophyta. A further discussion of the lines along which evolution carried the modification of this type of flower structure will be found in the article Plants, Morphological Evolution of.

Colors of Flowers.— Although the colors of flowers are very numerous and of many hues and shades, yet it is possible, usually, to segregate the flowers into two groups, the blue and the yellow. With each of these we may find red and white. It has been estimated that in an average collection of 1,000 plants about 284 have white flowers, 226 yellow, 220 red, 141 blue, 73 violet, 36 green, 12 orange, 4 brown and 2 black. Of these those with white flowers are almost universally fragant, with agreeable odors. Red flowers are usually more fragrant than yellow ones. The colors are due to pigments either dissolved in the cell sap or held in the chromoplastids. The latter is the case with many of the reds, oranges and yellows, which are due to carotin or some of its derivatives. The blues, violets and purples are due to a variety of substances in solution, known collectively as anthocyanin. In reality this is not a single substance but a group of chemically related compounds. Other groups of pigments are also present in some flowers. The whole subject is a very difficult one as on account of the non-crystalline nature of some of these coloring matters they cannot be obtained in a pure state and so are not easily investigated chemically.

Flowers of the Garden.— The features that make flowers attractive or useful to man are chiefly the bright colors, form and odor. These may be combined, all in the same flower, as in the Easter lily whose beautiful white color is matched by its graceful form and delightful odor; or the flower itself may be inconspicuous and have only its odor to make it welcome, as in the Mignonette. Other flowers may attract by their color and shape and entirely lack scent or even be disagreeable in odor. There is a fashion in flowers as in dress, so that many flowers popular a generation ago are not found now except in old-fashioned gardens.

In a large number of cases the flowers cultivated have undergone «doubling,» i.e., instead of the single whorl of petals there are many petals. The extra ones represent perhaps most often stamens that have been transformed to petals under the influence of conditions that are not well understood. In heads of flowers such as those of the sunflower where usually only the external circle of flowers is showy and the remainder rather inconspicuous, the doubling consists of the transformation of these central inconspicuous flowers into showy ones like those at the margin. This is also the case in the cultivated snowball bush in which all the flowers are sterile and showy instead of merely the marginal ones of the cluster as in the wild form.

Many of the most beautiful of the cultivated flowers are not found in nature but are the result of the plant breeder's art. See Plant Breeding.

Some of the commoner flowers have been in cultivation from antiquity, as in the case of the rose and pink, and have been discussed even in the writings of the ancients. On the other hand it has been only within the past hundred years or so that the systematic exploration of the world has revealed myriads of new plants many of which have been brought directly into cultivation or been made the subjects of the breeder's skill in improving sorts already known. It should be noted, for example, that in America the Canna was rarely grown until at the World's Fair at Chicago in 1893 the exhibit of new and gorgeous sorts in massed groups showed the value of this plant. The common blue Iris has been found in gardens for centuries but until recent years it has been only in large estates and botanical gardens that the showy sorts, white, cream, yellow, red and vari-colored were to be found, while now they are accessible to every flower lover. See Botany; Flowers and Insects; Fruit; Garden; Inflorescence; Plants, Structure of; Seeds; Vegetable Kingdom.

Ernst A. Bessey,
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FLOWER BEETLES, scarabeid beetles of several genera. One of the most abundant and destructive of these insects is the rose-chafer which annually does great damage to roses and other flowers and fruits. Several species of the genus *Euphoria*, more especially *E. inda*, is frequently found on flowers eating pollen, but it also attacks corn in the milk and eats into various forms of fruit. Other flower beetles belonging to the genera *Hoplia* and *Trichius* are commonly found on flowers throughout the country and take some part in the cross-fertilization of useful plants. Numerous other beetles frequent flowers among which are beautiful species of the genera *Clerus* and *Trichodes* of the *Cleridæ; Leptura* and many related genera of long-horned beetles; and many genera of small families such as the *Mordellidæ*.

FLOWER-BUG, a very minute bug (*Triphleps insidiosus*) also «insidious flower-bug,» and related to the bedbug. It is found on the foliage of various plants and preys upon other minute insects.

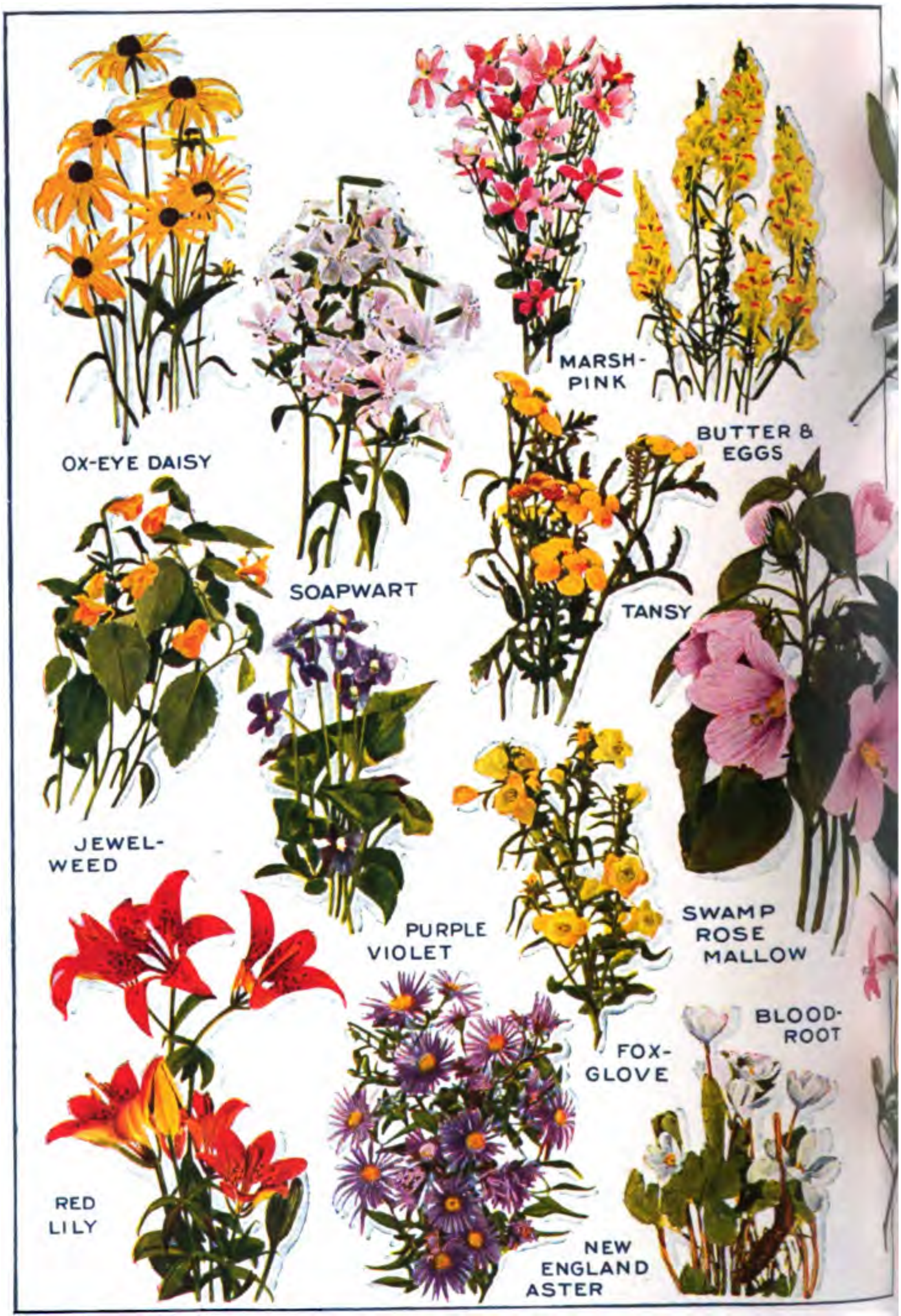
FLOWER MONTH, in general any month in any country in which flowers are springing most abundantly; in the United States, June is specially the month of flowers. Specifically, the month Anthesterion, the eighth of the Attic year, corresponding nearly to February; so called because that time was, in that country, the season of flowers.

FLOWER-PECKERS, general name for a large family (*Dicæidæ*) of small insectivorous birds allied to the creepers (q.v.) which get their food largely by searching flowering plants and their blossoms, picking up minute insects largely by aid of a curious tongue which is separated at the end into four tubular projections. They inhabit the Indo-China region and thence throughout the archipelagoes to Australia, where the white speckled diamond-birds (*Pardalotus*) and the swallow-dicæum (*Dicæum erythrorhynchum*) are familiar friends of the gardener. They frequent bushes and trees, hopping briskly about the branches and creeping and clinging like titmouses. Some make extremely beautiful, highly decorated nests, while others are content to deposit their eggs, which in most of the species are white, in holes in trees, or earthen banks, or old birds' nests. Some are plainly dressed, but most of the flower-peckers are gaudily colored and several sing sweetly.

FLOWERING FERNS. See Ferns and Fern Allies, *Filicales* (1).

FLOWERS, in chemistry, a term formerly applied to a variety of substances procured by sublimation in the form of slightly cohering power, hence in all old books we find mention made of the flowers of antimony, arsenic, zinc and bismuth, which are the sublimed oxides of these metals in a more or less pure state. We have also still in use, though not generally, the terms flowers of sulphur, of benzoin, etc.

FLOWERS, Artificial, flowers made from various materials to imitate natural blossoms.



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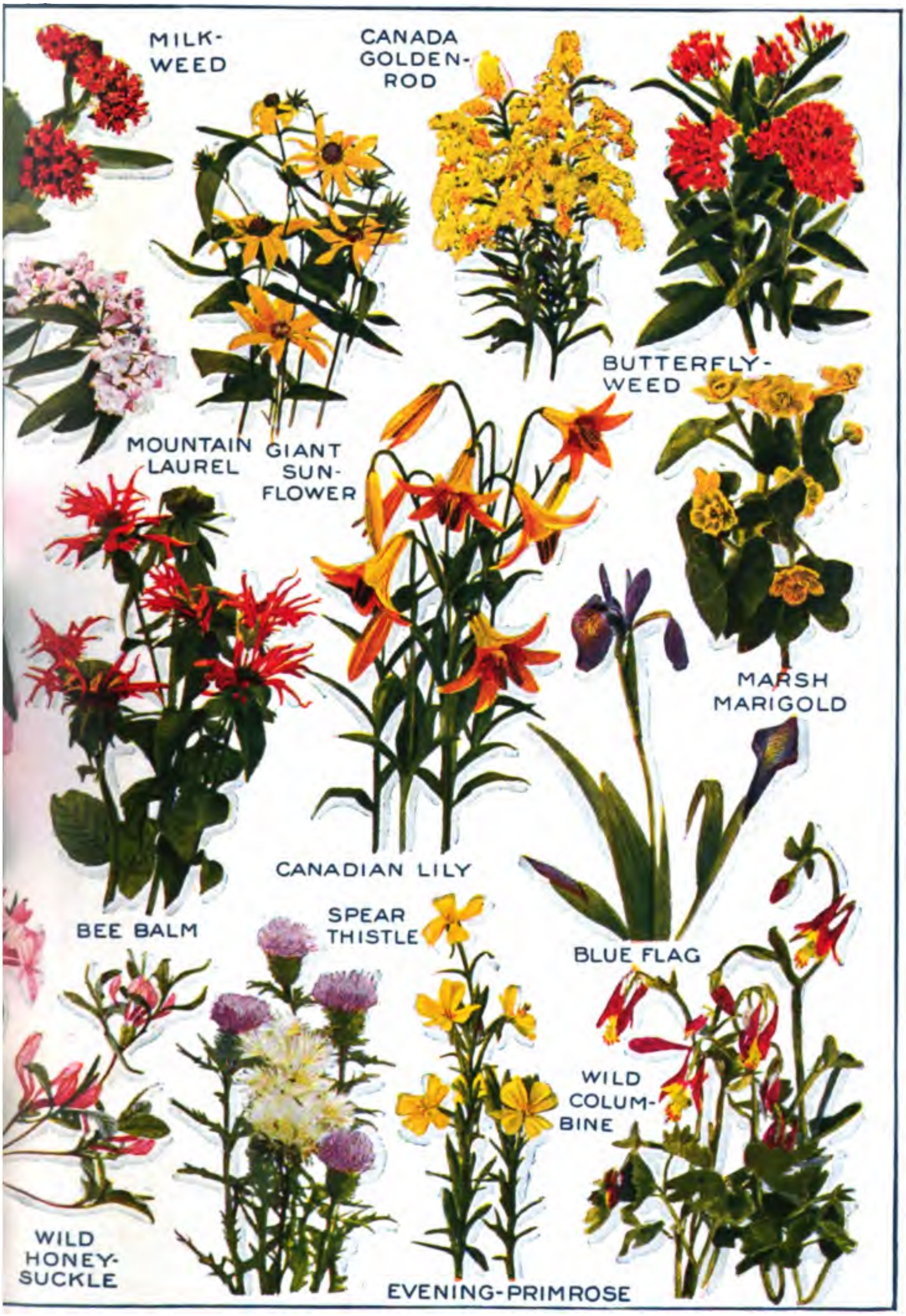
WILD FLOWERS O



NORTH AMERICA

These are not a modern invention. The famous floral wreaths made by the ancient Egyptians were formed from thin plates of horn stained in different colors, sometimes also of leaves of copper, gilt or silvered over. The Romans excelled in the art of imitating flowers in wax and in this branch of the art attained a degree of perfection which has not been approached in modern times. Crassus, renowned for his wealth, gave to the victors in the games he celebrated at Rome crowns of artificial leaves made of gold and silver. In modern times the Italians were the first to acquire celebrity for the skill and taste they displayed in this manufacture, but they are now far surpassed by English, American and French manufactures, more especially by the last-named. The Chinese and Japanese show great dexterity in this work.

The first artificial flowers made in modern times in civilized countries were manufactured out of many-colored ribbons which were twisted together and attached to small pieces of wire. But these first attempts were decidedly crude. In course of time feathers were substituted for ribbons, a more delicate material, but one to which it was not so easy to give the requisite shades of color. The plumage of the birds of South America is admirably adapted for artificial flowers on account of the brilliancy and permanence of the tints and the natives of that continent have long practised with success the making of feather flowers. The Zoological Gardens in Regent's Park, London, contain a magnificent collection of artificial flowers made out of the feathers of humming-birds. In South America artificial flowers are also composed of the wing cases and other parts of some brilliant specimens of beetles. In Italy the cocoons of silkworms are frequently used for the purpose, as these take on a brilliant color and have a velvety appearance. Among the other materials used in this manufacture are cambric, muslin, satin, velvet and other woven fabrics, blown glass, mother of pearl, brass, thin layers of whalebone, etc., besides the various vegetable and mineral coloring matters. Flowers were at one time made of porcelain and were perfumed. Great skill has been attained in the making of glass flowers and a remarkable collection of this kind is owned by Harvard University. The art of artificial flower making was introduced in the United States by French immigrants, whose workmanship successfully imitated the form and hue of natural flowers. In 1909 there were 225 artificial flower establishments in the United States employing 4,835 persons and products of a value of $9,041,447. Consult Van Kleeck, M., ‘Artificial Flower Makers’ (New York 1913).

FLOWERS, Fertilization of, by Birds.— That insects and especially bees, carry pollen from flower to flower as they visit them in succession in search of the nectar hidden deeply in their corollas, is familiarly known to most readers. The insects entering a flower brush against the anthers, rub off the pollen (usually a little sticky) and in entering the next flower leave some of it on the pistil by means of which it reaches the seed. Many flowers appear to have become adapted in their structure to this external means of cross-fertilization (q.v.).

It is not so well known, however, that birds perform a similar service to plants which, although far more limited than that of insects, is still of great importance in certain plant families, especially in the tropics. A large variety of minute insects penetrate blossoms in search of food and some virtually live there as long as the flowers last. This fact is well known to birds of many sorts and the long slender bills characteristic of some families are especially adapted to probing the big, tubular, nectar-holding and fly-infested corollas produced by tropical trees and herbs. Thus the banana plantations of the West Indies and Central America may be said to depend largely for successful crops on the prevalence of the banana quit (*Certhiola flaveola*), a small, plainly dressed creeper that searches the blossoms for these insects; in doing so the creeper's head becomes heavily dusted with yellow pollen, which is rubbed off against the pistil of other flowers as it pushes its head into them. These quits, or sugar-birds, of which tropical America has several species, have long curved bills and tongues frayed at the tip into a tiny brush. They search many sorts of flowers for insects, but neglect the nectar, or at any rate that is not the first attraction. The hummingbirds, however, which may be said as a class to live on what they find in flowers (accessible to them in the tropics the year round), feed upon both the insects and the sugary juices to be found there. For this their structure particularly adapts them. Their small size permits them to enter completely into the larger flowers, while their powerful wings enable them to poise in front of smaller ones and explore them with the long slender bill characteristic of the tribe. See HUMMINGBIRD.

About 500 species of hummingbirds have been described, differing much in details of size and color, especially in respect to the beak, for the straight bill of a Docmastes may measure five inches, while in Rhamphomicron it is only a quarter of an inch long. In some the bill curves slightly upward, in others downward and in Eutoxeres it is bent like a sickle. All these varieties of shape indicate special requirements, that is, the choice of particular blossoms; and Fritz Müller says that various species of abutilon in southern Brazil are sterile unless fertilized by the one kind of hummer that frequents each one. The hummingbirds dart into and out of a long list of tropical blossoms, gathering and leaving pollen, and several other cases of mutual dependence between them and plants might be mentioned. Thomas Belt (‘Naturalist in Nicaragua’ London 1873) describes the flowers of certain vines of the genus Marcgravia in which the corolla consists in part of a ring of pockets, or “pitchers” in various positions. In spring these fill with a sweetish liquid that attracts insects in large numbers, and these in turn lure hummingbirds, which alone among birds can reach the freely swaying flowers; but in order to rifle these sweet pockets, the bird must push past the generative parts (stamens and pistil) and thus give and take pollen on its glittering head or breast. The sabre-like flower of Erythrina offers a still more curious case of the need of hummingbirds, help in effecting healthful cross-fertilization.

The hummingbirds of America are represented in the warm parts of the Old World by the sun-birds and honey-suckers, which also are small and brilliantly plumaged, have rather long, and usually curved, fine-pointed bills, and protrusile tongues with split or else brush-like tips, with which it is easy to entangle a small bug or to extract nectar from its deep cup, for the tongue of these birds may be rolled into a sucking-tube. These resemblances to the American hummingbirds, with which they have no real relationship, merely show the acquirement by different kinds of birds of similar means to the same end — the rifling of flowers of honey and attendant mites of insects. The honey-suckers are Australian and are especially addicted to the eucalyptus trees and shrubs that profit by feeding the beautiful little creatures. The eucalyptus groves of Australia are also frequented by the peculiar parrots called lories or brush-tongued parrakeets. They are distinguished by the dense coating of papillæ on the tongue, with which they lick up honey and insects together from the big nectarous blossoms; and more than one writer has mentioned that their foreheads are smeared with yellow pollen as they fly from tree to tree.

It is a very significant fact that Australia and its neighboring islands are deficient in insects, especially bees and butterflies. It was necessary to import and acclimate bumblebees before clover could be raised there for fodder. This deficiency in healthful cross-fertilization for plants is supplied by birds and bats. Interdependence of certain tropical trees and lowlier plants and their birds is illustrated elsewhere. The West Indian logwood is not found except where a certain sugar-bird lives; and the same companionship is noticeable in the East Indies, according to Layard. Forbes ('Wanderings in the Eastern Archipelago' 1885), notes a plant in Sumatra dependent on a certain spider-eater (bird). Darwin concluded «that the beaks of birds are specially adapted to the various flowers that they visit»; and Grant Allen believes, conversely, that «many of the most brilliant and beautiful bell-shaped tropical flowers have been specially developed to suit the tastes and habits of those comparatively large and powerful fertilizers.»

ERNEST INGERSOLL.

FLOWERS, Language of. See FLOWERS, SYMBOLISM OF.

FLOWERS, Symbolism of, a special significance attached to flowers by means of which they are made to represent various ideas and sentiments. This mode of communicating thought has developed in certain countries into a language of remarkable elaboration. Among the Greeks and Romans the use of flowers was full of significance. Though the well-developed floral speech of the Romans was probably lost to a great extent, the study was revived in Europe during the Middle Ages, being especially appropriate in connection with such a romantic institution as chivalry. The Orientals have developed the language of flowers into a vehicle for communicating sentimental and amatory expressions of all degrees of warmth. Still further complexity is added by the habit of employing flowers the Turkish or Arabic names of which rhyme with the other really significant words. The language of flowers is, of course, arbitrary, and a bouquet which a Persian girl would understand would be unintelligible to an Egyptian inmate of the harem. Yet among European nations certain flowers have a common significance. The rose is widely accepted as the symbol of majesty, and of love and beauty; the forget-me-not of true love; the lily of purity; the violet of modesty; the daisy and white violet of innocence; the rosemary of remembrance; the amaranth of immortality; the asphodel of death and the unseen world; the pansy of thought; the hyacinth of sorrow; the narcissus of self-admiration; the poppy of oblivion. The almond expresses hope; the lily-of-the-valley unconscious sweetness; the wallflower, love faithful in spite of adversity; the primrose, early youth; and the cyclamen, diffidence. So surely as the orange-blossom is associated with marriage does the finding of white heather betoken good-fortune to come, while the future chances of love may be revealed from the daisy and poppy by a simple method of divination. The laurel has long been accepted as the emblem of glory, the oak of patriotism; the bay the poet's crown, and laurel the crown for beauty. In the Grecian games wreaths were placed upon the brows of the victors, but these were of leaves rather than blossoms. Floral garlands were much used at the feasts of the ancients, and in India it is customary to show special honor to a guest by encircling his neck with a wreath of flowers.

Historical and national associations cluster about certain flowers. The violet was the flower of Athens. The broom plant (*planta genista*) was worn by Geoffrey of Anjou, and hence arose the name Plantagenet represented in a line of English kings. The red and the white roses of Lancaster and York gave name to a great civil war. Particular families and clans have their floral badges and there are national and heraldic emblems drawn from the floral kingdom, such as the rose of England, the thistle of Scotland, the shamrock of Ireland, and the fleur-de-lis (q.v.) of France, the latter being associated for centuries with the royal crown. The corn flower or Kaiser-blume is the national flower of Germany. The pomegranate became a Spanish national emblem having previously been the emblem of Moorish Granada. In Japan, the chrysanthemum is the flower of the nation, and in India the lotus has an especially sacred significance, as it had formerly in Egypt. In the latter country it often figured in architecture. In the decorative art of India it is represented in bronze and in paintings in connection with divinities or exalted sages. The cactus is the national emblem of Mexico. No flower will ever become the national emblem of the United States in the manner in which such floral emblems have become connected with other nations, but an attempt has been made to gain an expression of popular opinion on the subject of a national flower and the golden-rod appears to lead in the contest, as it has done in the case of the Empire State, of which it has been chosen as an emblem. The legislatures of certain States have taken action on the choice of a State flower, Utah selecting the seg lily; Vermont, the red clover; Oregon, a native grape; Nebraska, the golden-rod; Michigan, the apple-blossom; Maine, the pine tassel and cone; Iowa the wild rose; Montana, the bitter root; Colorado, the white and blue columbine; and

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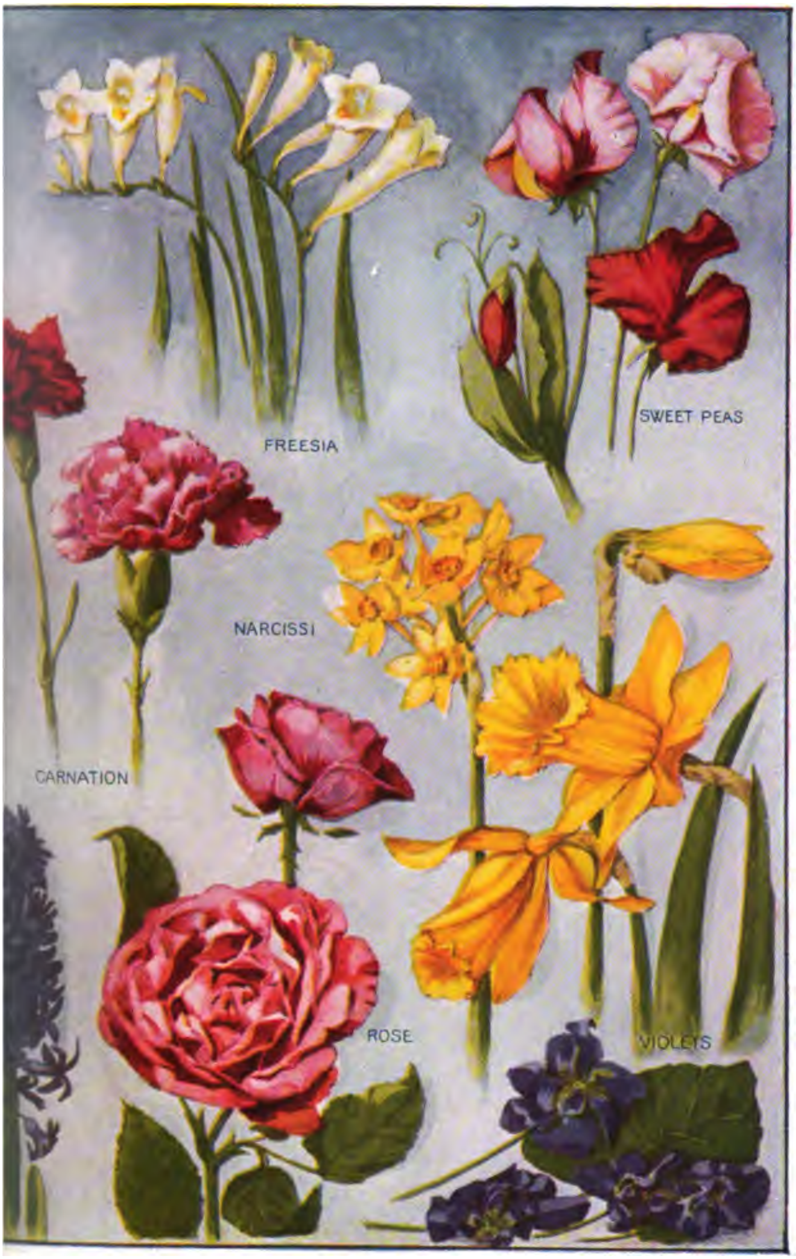
BRILLIANT AND FR



GRANT FLOWERS

Oklahoma, the mistletoe. In England what may be called a party emblem is illustrated in the adoption of the primrose generally but mistakenly known as Lord Beaconsfield's flower, by the Conservatives. Before the «Hundred Days» in French history, the violet was used by the adherents of Napoleon I to symbolize the hope of his return from exile. Consult Folkard, 'Plant Lore' (London 1884); Hale, 'Flora's Interpreter' (Boston 1835); Haig, 'The Floral Symbolism of the Great Masters' (New York 1913); Welsh, C., 'The Language Sentiment and Poetry of Flowers' (New York 1912).

FLOWERS AND INSECTS: Their Relations. The lower plants are dependent upon water for the accomplishment of fertilization in the course of their sexual reproduction. They possess nothing in the nature of flowers and are independent of insects. It is impossible now to determine whether the first plants with true flowers were of such nature that insects served for pollination. In view of the present rather generally accepted belief that the first flowers were of a type represented now most closely by the magnolia, it seems probable that the mutually beneficial interrelations of flowers and insects began at an early date in the development of the flowering plant phylum. The simplified flowers of grasses, sedges, pigweeds, oaks, elms and other plants dependent upon wind for pollination are now seen clearly to be descended from flower types of a more showy nature that were insect-pollinated.

The insects are benefited in this relation by the food that they obtain. This is of two kinds, nectar and pollen. It is probable that the first insect visitors of flowers, ages ago, were pollen gatherers which used the pollen for food just as many insects do now. Later, probably, came the production of nectar by the flower; a lure that is attractive to still larger numbers of insects and that saves to a certain extent the precious pollen. The additional lure of special odors was presumably developed at about the same time. The development of bright or showy colors on the flowers themselves or on adjacent bracts to attract the insects by the sense of sight must have taken place rather early also, but the fossil records are so imperfect that the exact period cannot be determined. It is unfortunate that as a whole the flower is rather poorly adapted for preservation as a fossil, and especially such delicate parts as petals, stamens, nectaries, etc. Consequently we know more about the structure of the reproductive cones of the fossil Bennettitales, which are considered to be the forerunners of flowers than we do of the earliest true flowers themselves.

The earlier investigators of the relations of insects to flowers, such as Sprengel, Darwin and Hermann Müller, laid perhaps too much stress upon the value of the bright coloration of the flowers as a lure for insects. There is no doubt that a great many insects are guided to the flowers by the sense of sight. Thus it is noteworthy that night blooming flowers are usually large and white, thus being more conspicuous than if of any other color. On the other hand it must be admitted that the large amount of perfume given off by such flowers cannot fail to attract night flying moths and other insects, even from great distances, until they are near enough to see the flowers. This is probably the case, too, with many day blooming species. The work of Plateau, in Belgium, and of others has shown that if the odors be present many insects will continue to visit flowers, even if they are so mutilated by the removal of petals and other showy parts as to be comparatively inconspicuous. Possibly some groups of insects pay no attention at all to the shape or color of the flower but are guided solely by the odor. On the other hand the existence of (to us) odorless flowers which are very showy and freely visited by insects would seem to indicate that the colors are of advantage. Indeed, experiments with differently colored pieces of cloth, all scented in the same way so as to be attractive to insects, demonstrated that although the amount of odor for each piece was the same yet the brighter colored pieces actually drew more insects from a distance than the dull or inconspicuous pieces. The fact that some inconspicuous flowers that are nectariferous and sweet scented are freely visited by insects demonstrates that however advantageous it may be to have showy flowers to allure the insects, still that is not an absolutely indispensable feature.

In some cases the flower appears to secrete no nectar although the odor is sweet. Other flowers emit a very disgusting odor. So, for example, the flowers of a South African genus of the milkweed family, *Stapelia*, give out the odor of carrion. The large star-shaped blooms are marked with a brown or purple mottling, resembling in some species the belly of a toad. The carrion scent is very intense and attracts various carrion-moving flies which wander over the flower in an attempt to find a suitable place to deposit their eggs. In this process they lead to the pollination of the flower.

The actual benefit to the flower of this intimate relation between insects and flowers lies in the transfer of the pollen from the stamens to the stigma of the pistil, upon which is dependent the production of the seeds. In flowers that are dependent upon insects (entomophilous flowers) the stigma and stamens are not in sufficiently close juxtaposition to permit of the direct transfer of the pollen or this transfer is prevented by other means. The pollen, moreover, is often of such a character that it is not easily transported by the wind, either because of its size, on account of its sticky nature, its location, etc. Insects (more rarely birds, snails and other animals) that visit the flower in search of the pollen or nectar or for any other purpose become more or less covered with pollen. Their bodies and appendages are to a considerable extent covered with hairs to which the pollen adheres or with which they become entangled. In addition, some of the bees and wasps have special structures for holding pollen. It is a familiar sight to many to see bees on their return to the hive laden with nectar and with the two posterior legs bearing large masses of pollen. In moving about in the flower some of the pollen may be transferred directly from the stamens to the stigmas; when the insect visits another flower some of the pollen from the first flower is carried to the next one. Soon after pollination has occurred we find that the emission of odors and the secretion of nectar cease, and in most cases the petals fall or shrivel so that the flower no longer exerts a lure for insects.

Floral Modifications.—As noted in the article FLOWER (q.v.) some plants do not set seed well and others not at all when pollenized by pollen from the same flower. In many cases the floral structures are so arranged that self-pollination is impossible, even when the flower is visited by insects. In the simplest cases the stamens set free their pollen at a time other than that when the stigma is receptive. Such flowers may shed all their pollen first (proterandry) or they may wait until after the stigma has passed the receptive stage before the pollen begins to be set free (proterogyny). In such cases the period during which perfume and nectar are produced may be considerably longer than in those flowers where stamens and stigma are mature at the same time. In more specialized cases the flower assumes a shape such that the visiting insect must enter it at a definite place, thus insuring that any pollen obtained from a flower previously visited shall be brought into immediate contact with the stigma. In the sage (*Salvia*), for example, the flower is strongly two lipped. The bee settles on the lower lip and can enter the flower only one way. (See Fig. 1). In inserting the head and tongue into the flower in search for the nectary the tongue comes into contact with the peculiar extensions of the hinged stamens and in pushing these up so as to get at the nectar causes the anterior, pollen-bearing portion to curve downward until in contact with the back of the insect which is thus dusted with the pollen. In flowers at this stage the style and stigma lie concealed under the arching upper lip of the corolla. As the flower gets older the style curves somewhat so that the stigma now comes in contact with the back of a visiting bee, thus receiving the pollen deposited there by the hinged stamens of another flower. The stamens having discharged their pollen twist to the sides so as to be out of the way. In the Lady's Slipper (*Cypripedium*) the lower lip is a large sack with a median opening through which insects, bees chiefly, may easily enter, attracted by the odor. Downward pointing hairs and the incurving of the border of the opening prevent the insects escaping by the opening through which they entered. There are, however, two other openings, leading up by the stigma and stamens. After the bee has fed sufficiently on the sugary secretions of the hairs it climbs up to one of the small openings and squeezes out. In doing this it comes into close contact first with the stigma and then against a stamen, becoming covered with pollen from the latter. On visiting the next flower this pollen is brushed off upon the stigma and perhaps a second load of pollen acquired. Charles Darwin studied the relation of insects to this and other orchids and found that many orchids are incapable of being pollenized except by certain insects, so fully are the flowers adapted in structure to fit the structure and dimensions of these particular insects. Kronfeld noted that all of the species of monkshood (*Aconitum*) are confined to those parts of the world where bumble bees (*Bombus*) are native. Because of their rather deep-seated nectaries their nectar is not available to short-tongued bees and flies which are not built in such a way as to be able to pollenize the flowers.

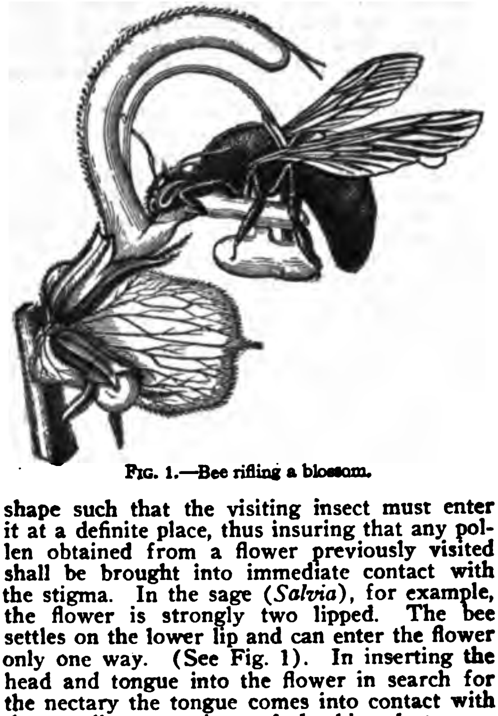


FIG. 1.—Bee rifling a blossom.

Sprengel, who at the close of the 18th century was the first to study closely the relation of flowers to insects, pointed out that the various rows of dots or lines with which flowers are marked lead to the places where the nectar was concealed. He called these nectar guides and proposed the theory, still generally accepted, that they indicate to the insects visiting the flower the position of the nectar and thus lead them to assume positions best suited for the process of cross-pollination. He also pointed out that the nectar is almost always well protected from rain. Nearly 90 years later, the Austrian botanist, A. Kerner von Marilaun, drew attention to the fact that not only was the nectar carefully protected from washing by rain but even more completely so from robbery by insects not suited to effect pollination. Thus ants are kept away from the flowers of many species of catchfly (*Silene*) by bands of a sticky secretion at or near the nodes, and a great many flowers are protected from these same unwelcome guests by sticky hairs on the stem or on the flower stalk or outside of the calyx. In the teasel (*Dipsacus*) the leaves are joined together at their bases to form cups which become filled by rain water and thus effectually bar the way for small creeping insects. Many flowers have tufts of soft or sometimes stiff hairs in such positions that small insects that reach the flower by flight cannot pass down to the nectar although the larger and stronger insects are able to push their tongues past the hairs to the nectaries, and in so doing to pollenize the flower. Night-blooming flowers usually dispense no attractive odors during the day and frequently are without nectar until night, so that they are not liable to visits from the undesired day insects. Some flowers maintain such positions that only certain insects are able to enter them or to extract the nectar. Nevertheless many flowers are subject to robbery by short-tongued bees which, instead of entering the flower by the regular way, a method impossible for them on account of the shortness of their tongues, go directly to the exterior of the flower just opposite the nectary and gnaw a hole through the base of the corolla and in this manner gain possession of the nectar, without, of course, pollenizing the flower. Thus some species of monkshood (*Aconitum*) show a high percentage of their blossoms rifled in this manner. Even the flowers of red clover are frequently robbed by short-tongued bees that cannot reach the nectar from the top of the flower.

Heterostyly.— Sprengel noticed that in certain plants the stamens and pistils were of different length in the flowers of some plants than in those of others of the same species. It was not, however, until Darwin studied the subject that the matter was cleared up. He showed that the common yellow cowslip or primrose of England (*Primula officinalis*) had two forms of flowers, the long-styled and the short-styled. (See Fig. 2). In the former the stigma is on a level with the top of the tube of the salverform corolla and the stamens are attached to the inside of the tube about half way from the base to the top. In the other form the stamens are attached at the top of the corolla tube and the short style brings the stigma only about half way to the top. The two forms are always on separate plants. When visited by insects, chiefly bumble bees, the base of the proboscis becomes covered with pollen in the case of the short-styled flowers, and the middle portion with the long-styled flowers. Upon visiting a flower of the opposite type the pollen upon the base of the proboscis is brushed off upon the stigma of the long-styled flower while that upon the middle of the proboscis pollenizes the stigma of the short-styled form. Darwin's further experiments showed that while pollenization of a flower with pollen from another flower of that same type would result in a certain amount of good seed, yet these "illegitimate" unions were not nearly so productive of good seed as when short-styled flowers were pollenized with pollen from the long-styled flowers and vice versa. The ratio was as 35 to 54. When the legitimate union took place the seeds produced would give rise to both kinds of plants.

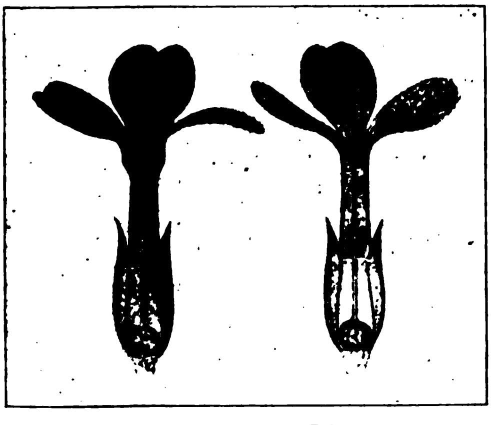


FIG. 2.—Heterostyly in Primrose.

Even more complicated than the case of the primrose is that of the loosestrife (*Lythrum salicaria*) in which three types of flowers exist, those with (1) long styles and medium and short stamens, (2) medium styles and long and short stamens, and (3) short styles and long and medium stamens. (See Fig. 3). When pollenized by pollen from stamens differing in length from the style (illegitimate unions) the flowers are absolutely sterile in some cases and only partially fertile in others, while when the pollen comes from stamens of the same length as the style (legitimate union) the fertility is very high.

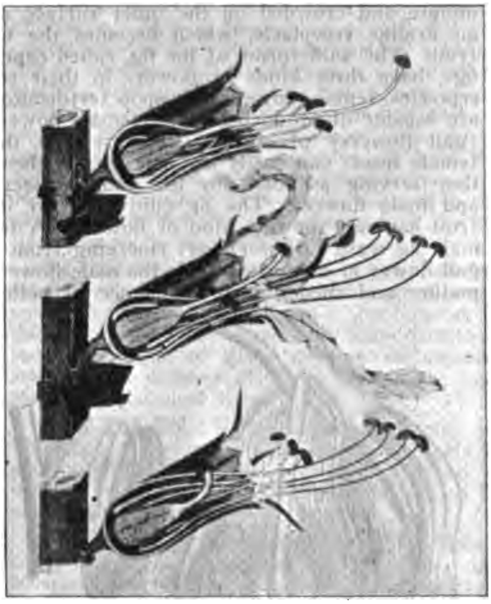


FIG. 3.—Heterostyly in Loosestrife.

Spanish Bayonet.— The relation between insect and flower in the various species of Spanish Bayonet (*Yucca*) is one that has led to a great amount of speculation in the attempt to explain the evolution of such habits. The plants have large white or cream-colored, bell-shaped flowers which hang with the opening directed downward. The blossoms are free from nectar or nearly so. The stamens are much shorter than the pistil and are curved away from it. The stigmatic surface is not at the summit of the pistil, as is the usual arrangement, but on the interior of the hollow style, where there is no possible chance of the pollen being brought by the wind or by ordinary insect visitors. Fertilization is effected by the females of moths (see Fig. 4) of the genus *Pronuba,* the species common east of the Rocky Mountains being *Pronuba yuccasella,* which visit the flowers at dusk and go to each stamen, scraping off the rather sticky pollen with specially modified mandibles, massing it into a large ball held beneath the head. After collecting the pollen the moth usually flies to another flower and deposits one to several eggs in the ovary, after each act rushing to the top of the pistil and pushing down into the hollow style part of the pollen from the ball, putting it as far into the hollow as she can reach. She then flies to another flower, lays more eggs, and pollenizes that flower, and so on until the eggs are all deposited. Sometimes in the meantime she stops and collects more pollen. The eggs hatch into small larvæ which destroy a few of the very numerous seeds. However, as no seeds are set without the activities of this insect the plant can well afford to spare the few seeds consumed.

Fig.— The flowers of the fig are very minute and crowded on the inner surface of an urnlike receptacle, which becomes the fig fruit. The wild forms of the fig, called caprifigs, have three kinds of flowers in their receptacles, female flowers that upon fertilization are capable of producing seeds, female flowers (gall flowers) of such a structure that the female insect can easily lay her eggs in them, they serving as food for the young insects, and male flowers. The fig cultivated for its fruit has only the first kind of flowers. A female fig wasp (*Blastophaga*) emerging from a gall flower of a capri-fig finds the male flowers mature and shedding an abundance of pollen so that as she works her way around in the rather limited space in making her exit from the receptacle she becomes covered with pollen. She immediately seeks out another young receptacle and forces her way in through the narrow opening, leaving her wings behind in the process. She hunts around in the receptacle for the gall flowers and lays an egg in each one she finds. In her search she passes over the stigmas of the other type of female flowers and pollenizes them. Or it may be that she enters the receptacle of a fig in which case she searches in vain for the gall flowers but in her search pollenizes the female flowers. She at length dies of exhaustion, but her work is done so far as the plant is concerned. It is customary for growers of figs to hang branches of capri-figs from which the gall insects are just emerging in the fig trees in order that the latter may set fruit. There are many species of the genus *Ficus* and many species of *Blastophaga* corresponding. In most species of *Ficus* there is not so strong a differentiation into gall flowers and fertile flowers as in the capri-fig.

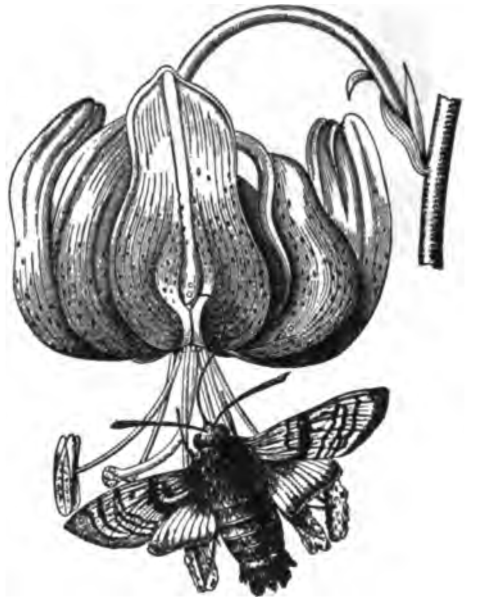


FIG. 4.—A hawk-moth sucking nectar from a tiger-lily.

Origin of the Special Modifications.— Much has been written to try to explain the minute correspondence of structures of flowers and the insects that fertilize them. In view of the fact that we are as yet far from any agreement as to the kinetic factors of evolution it may be imagined that these attempted explanations are mostly in the nature of speculations in which the writers attempt to find support for preconceived theories, rather than to draw up a hypothesis to fit observed facts. It seems almost beyond doubt that natural selection has had a large part in the elimination of unfavorable modifications, but we still do not know what causes these variations in the first place or even whether there is an observable relation between the kind of modification and the conditions under which the plants and insects have developed. Until these questions are in more universal agreement it may be well to leave the subject without further speculation.

Bibliography.— Darwin, 'Forms of Flowers' (London 1877); Knuth, 'Handbook of Flower Pollination' (Eng. trans., Oxford 1906); Kerner von Marilaun, 'Flowers and their Unbidden Guests' (Eng. trans. 1878).

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FLOWING WELLS. See ARTESIAN WELLS.

FLOY, James, American Methodist clergyman: b. New York 1806; d. 1863. He was educated at Columbia College and at the Royal Botanical Gardens, London. He was for sometime a clerk in the employ of the Methodist Book Concern, entered the ministry of the Methodist church and held several pastorates in New York city and vicinity. He was censured by his Conference because of his presence at an Abolition convention. He edited the *Methodist Hymnbook* of 1849, served as secretary of the Tract Society and edited the *National Magazine* from 1856 to 1860. He was the author of 'Biblical Morality' (1861); 'Lessons in Bible History' (1861); 'Old Testament Characters Delineated and Illustrated' (1864); 'Occasional Sermons, Reviews and Essays' (1865). Consult *Methodist Quarterly Review* (issue of January 1864).

FLOYD, John Buchanan, American statesman: b. Smithfield, Montgomery County, Va., 1 June 1807; d. near Abingdon, Va., 26 Aug. 1863. He was educated at Columbia College, South Carolina, graduating in 1829; studied law and settled in southwest Virginia; was a member of the Virginia legislature several terms and was governor of the State 1850–53, his term being notable for his advocacy of the policy of public improvements. In 1857 he was appointed Secretary of War in the Cabinet of President Buchanan, and remained in it until 29 Dec. 1860, when he resigned because he considered the action of Major Anderson in occupying Fort Sumter a breach of faith to South Carolina. He went to Abingdon, Va. On 29 Jan. 1861 the grand jury of the District of Columbia indicted him as privy to a defalcation in the Department of the Interior. He returned to Washington, gave bail and demanded a trial, and the government thereupon, on 7 March 1861, entered a *nolle prosequi.* After his departure he was also accused of having transferred arms from Northern to Southern arsenals in order to arm the South for the Civil War. This charge was investigated by a Congressional committee, which, on 18 Feb. 1861, made a report showing it to be groundless, the arms transferred having been condemned arms, removed in order to make room in the Northern arsenals for modern ones. In the summer of 1861 he was appointed a brigadier-general in the Confederate army and raised a brigade which served in West Virginia until ordered to join the army of Gen. A. S. Johnston in the West. He was sent to Fort Donelson, arriving there after fighting had begun. When surrender was discussed, he transferred the command to Buckner and extricated his brigade; in consequence of which he was removed from command by Jefferson Davis. The State of Virginia thereupon appointed him a major-general in its service. Consult Davis, 'Rise and Fall of the Confederate Government' (1881); Nicolay and Hay, 'Life of Lincoln' (1890).

FLOYD, William, American statesman: b. Brookhaven, Long Island, N. Y., 17 Dec. 1734; d. Weston, Oneida County, N. Y., 4 Aug. 1821. He entered political life as a delegate to the Philadelphia Congress of 1774. The next year he was appointed a delegate to the first Continental Congress and continued by successive reappointments a member of every Continental Congress up to 1782 inclusive. From 1777 to 1788 he also was a State senator under the first Constitution of New York, and in the Presidential elections of 1792, 1800 and 1804 was a Presidential elector.

FLÜCKIGER, flük'ĕ-gėr, **Friedrich August,** German pharmacognosticist: b. Langenthal, Switzerland, 1828; d. 1894. He was educated at Berlin, Ban, Geneva and Heidelberg, became president of the Swiss Association of Apothecaries in 1857 and in 1881 was member of a committee appointed to revise the pharmacopœia of the German Empire. He wrote, in conjunction with Hamburg, 'Pharmacography: A History of the Principal Drugs of Vegetable Origin met with in Great Britain and British India' (1879), and works in German and French on the nature and history of drugs.

FLUDD, Robert, English philosopher and physician: b. Bearsted, Kent, 1574; d. 1637. He received his education at Oxford and traveled extensively in Europe for six years. He studied medicine after his return and was licensed to practice in 1606. He became interested in natural philosophy and invented several machines, including an automatic dragon and, according to some, the barometer. He wrote several pamphlets in defense of the Rosicrucians, in whose doctrines he became interested about 1615. He attempted the formulation of a system of philosophy identifying physical with spiritual truth and based mainly on Paracelsus. Kepler, Gassendi and others published refutations of Fludd's system. He wrote 'Tractatus theologophilosophicus' (1617); 'Veritatis Proscenium' (1621); 'Philosophia Sacra et vere Christiana' (1629); 'Philosophia Moysaica, (1638); 'Sophiæ cum Moria Certamen' (1629). Consult Waite, 'Real History of the Rosicrucians' (London 1887).

FLUE. (1) A passage for the conveyance of the volatile results of combustion from the fireplace to the open air, or into another passage; a smoke duct, the passage in a chimney; one of a cluster of smoke ducts in a stack of chimneys. Also a passage in a wall for the conveyance of heat from one part of a building to another. (2) In organs, a pipe of flute quality; also one with a lip; hence, one of the divisions of stops. (3) In a steam-boiler, locomotive, etc., a pipe for the conveyance of the caloric current through a boiler, to heat the surrounding water, as distinguished from a pipe for water or steam. It is usually secured in the sheets of the fire box and smoke box respectively, as in the locomotive.

FLÜELEN, flü-el'ĕn (Ital. *Fiora*), Switzerland, village in Uri Canton, situated near the southern end of Lake Lucerne. Its location at the junction of the Axen and Saint Gotthard roads makes it of great military importance, and a large number of Swiss troops are permanently stationed there. Pop. 1,084.

FLUELLEN, a humorous character in Shakespeare's play, 'Henry the Fifth.' He is a disputatious little soldier, pugnacious, and as voluble as his Welsh accent permits him to be when attempting to speak English.

FLÜGEL, flü'gel, **Ewald,** German-American philologist: b. Leipzig, 1863; d. 1914. He received his education at the University of Freiburg and at Leipzig, where he received the degree of Ph.D. in 1885. From 1888 to 1892 he was privatdozent at Leipzig, and coming to America in the latter year was appointed professor of English philology at Leland Stanford Junior University. In 1901–02 he was president of the western branch of the American Philological Association. He published 'Carlyle's Religiöse und Sittliche Entwickelung' (1887; Eng. trans., 1890); 'Sidney's Astrophel and Defense of Poesy' (1889); 'Neuenglisches Lesebuch I': 'Periode Heinrichs VIII' (1895); 'Die nordamerikanische Litteratur' (1907); Prolegomena to 'Chaucer Dictionary' (Vol. I, 1911–13), and articles in philological periodicals. He edited 'Mitteilungen Beiblatt zur Anglia' (2 vols., 1890–91); 'Chaucer Lexicon' (1891 et seq.); and *Anglia* (1889–).

FLÜGEL, Gustav Leberecht, German orientalist: b. Bautzen, 18 Feb. 1802; d. Dresden, 5 July 1870. He was educated at the gymnasium of his native town and studied theology and philology at the University of Leipzig. Later he made special studies in Oriental languages at Vienna and Paris. In 1832 he became professor at the Fürstenschule of Saint Afra at Meissen. He resigned in 1850 and in the following year went to Vienna, where he was engaged to catalogue the Arabic, Turkish and Persian manuscripts of the court library. His principal work is an edition of the bibliographical and encylcopædic lexicon of Haji Khalfa, with Latin translation (7 vols., London and Leipzig 1835–58). Other works are an edition of the Koran (Leipzig 1834 and 1893); 'Concordantiae Corani Arabicæ' (ib. 1842; 1898); 'Mani, seine Lehren und seine Schriften' (ib. 1862); 'Die grammatischen Schulen der Araber' (ib. 1862); 'Ibn Kutlûbugas Krone der

Lebensbeschreibungen’ (ib. 1862); an edition of ‘Kitab-al-Fihrist,’ published after his death.

FLÜGEL, Johann Gottfried, German lexicographer: b. Barby on the Elbe, 22 Nov. 1788; d. Leipzig, 24 June 1855. He spent many years in the United States prior to 1820 in business, diplomatic and official occupations, and became professor of English in the University of Leipzig in 1824. He compiled a ‘Complete English-German and German-English Dictionary’ (1830), besides publishing ‘A Series of Commercial Letters’ (9th ed., 1874); ‘Practical Handbook of English Business Correspondence’ (9th ed., 1873); ‘Triglot; or Mercantile Dictionary in Three Tongues — German, English, French’ (2d ed., 1854); and other useful manuals, all revised or brought down to contemporary needs by his son.

FLÜGEL, Otto, German philosopher: b. Lützen 1842. He studied at Schulpforta and Halle, and took up pastoral work; was made editor of the ‘Zeitschrift für exacte Philosophie im Sinne des Neueren Philosophischen Realismus,’ and in 1894 was one of the founders of ‘Zeitschrift für Philosophie und Pädagogik.’ He supports Herbartian realism, as opposed to New-Kantian speculations, yet he believes in the necessity of a revelation. Among his works may be mentioned ‘Die Spekulative Theologie der Gegenwart’; ‘Das Ich und die sittliche Idee im Leben der Völker (1892); ‘Über die persönliche Unsterblichkeit’ (1902); Monismus und Theologie’ (1908).

FLÜGGE, flü'ge, **Karl,** German sanitation expert: b. Hanover, 1847. He studied at the universities of Göttingen, Bonn, Leipzig and Munich. In 1878–83 he was lecturer at the University of Berlin and in 1883 became professor of hygiene at the Göttingen Hygienic Institute. He removed to Breslau in a similar capacity in 1887 and in 1909 was appointed professor of hygiene at the University of Berlin. He has made important investigations in experimental hygiene and bacteriology. His works include ‘Beiträge zur Hygiene’ (1872); ‘Die Mikroorganismen’ (3d ed., 1896); ‘Grundriss der Hygiene’ (new ed., 1902); ‘Ueber das Absolute in den ästhetischen urteilen Langensalza’ (1901). With Koch, he was joint editor of *Zeitschrift für Hygiene* after 1886.

FLÜGGEN, flü'gĕn, **Gis'bert,** German painter: b. at Cologne, 9 Feb. 1811; d. Munich, 3 Sept. 1859. In his youth he learned the manufacture of novelties in his native town, and in 1833 began his art studies at Munich, which he made his permanent home. He is a German counterpart of Hogarth and Wilkie, whom he rivals in masterly grouping and life-like expression, while in the technique of the brush he excels them both.

FLUID LENS, in optics, a lens in which a liquid is imprisoned between circular glass disks of the required curvatures. Attempts to obtain achromatism have been made by using metallic solutions and other liquids having a higher dispersive power than flint glass.

FLUKE, a fish, one of the smaller deep-water flounders (*Glyptocephalus cynoglossus*), common near both coasts of the North Atlantic, caught by means of beam-trawls in great quantities, and highly prized as food, especially in Great Britain, where it is considered little inferior to the sole. It is the «craig fluke» of Scotland. See Flounder.

FLUKE, a parasitic flatworm of the class Trematoda (q.v.). The blood fluke, liver fluke and long fluke are important parasites of man, producing serious diseases in some parts of the world.

FLUME (Latin *flumen*, stream), an artificial channel or conduit used to convey water for power development, hydraulic mining and irrigation. Flumes are commonly built of wood, but may be of steel or concrete; they are placed above ground, frequently supported on trestles, as it is necessary to maintain a gentle grade. The construction of flumes in mountainous regions is often attended with considerable engineering difficulties. They are made rectangular and circular, the latter being often of matched boards bound with steel bands, like a barrel. See Irrigation; Logging; Mines and Mining.

FLUOR-SPAR. See Fluorite.

FLUORESCENCE, that property of certain bodies in virtue of which they become self-luminous when exposed to light of certain wave-lengths. All bodies reflect a part of the incident light, but fluorescence is more than a mere reflection, as may best be shown by an example. «Canary glass» (glass colored slightly with oxide or uranium) exhibits a beautiful yellowish-green surface color when well illuminated, and for this reason it is much used for the production of ornamental effects. If a ray of sunlight be admitted into a darkened room through a piece of cobalt glass that is so dense that the feeble violet light that it transmits is barely visible, the canary glass shows its yellow-green color brilliantly when placed in its path. This shows that the phenomenon is not simple reflection, and further evidence of the same sort may easily be had. Glass that is tinged brownish-yellow by oxid of gold is almost perfectly transparent to the golden light from the canary glass, but if the violet light from the cobalt glass is caused to traverse the gold-oxide glass before striking the canary glass, the fluorescence is no longer observed. Furthermore light that has passed through one piece of canary glass is incapable of exciting fluorescence in a second piece. These and other equally remarkable phenomena indicate that a fluorescent substance absorbs a portion of the light that strikes it, modifies it profoundly in some manner, and then radiates it again. Stokes has shown that the modification consists in increasing the wave-length of the incident light; and it is now known that fluorescent light invariably has a greater wave-length than the primary light that excites the fluorescence. This fact has an important bearing upon many of the phenomena of physics. When it had been determined, for example, that the «X-rays» differ from ordinary light merely by having a very different wave-length, the question whether their wave-length is longer or shorter was immediately answered by the fact they can excite brilliant fluorescence. Knowing that the X-rays are either too long or too short to affect the eye, and knowing also that fluorescent light always has a longer wave-length than the light that excites it, it follows at once that the X-rays have a shorter wave-length than ordinary light.

Many substances exhibit fluorescence to a greater or lesser degree. An aqueous infusion of horse-chestnut bark shows it brilliantly, and so also does a solution of sulphate of quinine. Certain of the coal-tar colors (q.v.) are conspicuously fluorescent, fluorescein taking its name from this fact. Kerosene is fluorescent, and sometimes strongly so. Most fluorescent substances cease to emit light almost instantaneously when the incident light is cut off from them. Some, however, such as calcium tungstate and the sulphids of calcium, barium, and strontium, continue to emit their rays for a sensible time, fading gradually away into darkness after the incident light ceases to excite them. Instruments consisting of screens that are coated with some fluorescent material and protected from ordinary light by shields, or by enclosure within a light-tight box, are known as «fluoroscopes,» and are used for studying the X-rays (or Röntgen rays), and the shadows cast by them. It is to be observed that fluorescence differs from phosphorescence (q.v.) not only because it is usually of very short duration, but primarily because it is induced by the exciting action of light-rays. Phosphorescence may be due to very different causes. The light emitted by phosphorus, for example, is probably due to the slow oxidation of that substance. That which is observed in the ocean at night, and in connection with various fungi and insects, is due to causes which are more or less obscure; but in any event these various phosphorescent phenomena are quite different from true fluorescence. The name «fluorescence» was coined by Sir George G. Stokes in 1852, from the fact that the mineral fluorite sometimes exhibits the phenomenon. Previous to 1852 fluorescence was known as «epipolic dispersion.» Consult Stokes, ‹Burnett Lectures on Light› (1884–87); Preston, ‹The Theory of Light› (London 1901); Wood, ‹Physical Optics› (1905).

FLUORIDES. See FLUORINE.

FLUORINE, a gaseous, non-metallic element, possessing properties resembling those of chlorine, and exhibiting powerful chemical activity. It occurs in nature widely but sparingly, and always in combination, notably in the minerals fluorite and cryolite, from the former of which it takes its name. It is found in the topaz, in fluorcerite and yttrocerite, in apatite, wavellite, and wagnerite, in sea water and various mineral springs, and in the siliceous stems of grasses. In the animal kingdom it appears as a component of bones, blood, the brain, the enamel of the teeth, milk and urine, but always in minute quantities. The elementary character of fluorine was first recognized by Ampère and Davy about 1810; but although many attempts were made to isolate it, none was certainly successful until 1887, when Moissan succeeded in preparing it in the elementary state by electrolyzing a solution of hydrogen potassium fluoride, HF.KF, in perfectly anhydrous hydrofluoric acid, the solution being contained in a platinum vessel whose temperature was maintained at 10° F. below zero, and the electrolysis conducted by means of 20 Bunsen elements connected in series. When thus prepared fluorine is a gas of a light greenish-yellow color. It has a penetrating odor, quite disagreeable, and resembling that of hypochlorous acid, and it produces irritation in the membranes of the eye and nose. Many of the elements take fire when immersed in it, and burn with the formation of their fluorides. Water is decomposed by it, with the formation of hydrofluoric acid, HF, and the liberation of ozonized oxygen; and in fact fluorine appears to combine with all known elements except oxygen and carbon, and argon, helium, and the other recently discovered inert gases of the atmosphere. Fluorine has the chemical symbol F, is a monad, and has a density of 1.310, a molecular weight of 38.10 and an atomic weight of about 19. Few of the physical properties of the element are yet known, on account of the difficulty of handling it. It corrodes glass rapidly, for example, and for this reason glass vessels cannot be used in experimenting with it. It attacks violently all organic substances, carbonizing and setting fire to cork almost instantly. Alcohol, ether, benzine and turpentine take fire at once when brought into contact with it.

Fluorine combines with hydrogen directly even in the dark, and with detonation, even at the temperature of liquid hydrogen, the compound, HF, that is formed being known as hydrofluoric acid. Hydrofluoric acid is more conveniently prepared by means of the action of strong sulphuric acid upon the mineral fluorite (calcium fluoride, CaF_2). The reaction is as follows: $H_2SO_4 + CaF_2 = 2HF + CaSO_4$. Hydrofluoric acid is a colorless gas at ordinary temperatures and pressures, fuming strongly in the air. It condenses at 5° F. below zero to a colorless, mobile liquid having a specific gravity of about 0.988, boiling, at ordinary atmospheric pressure, at 67° F., and solidifying at — 152° to a transparent white crystalline mass, which melts again at — 134°. As thus prepared, liquid hydrofluoric acid contains traces of water; but these may be removed by electrolysis, the liberated fluorine combining with the water as noted above, and the oxygen of the water escaping in the free state. When the water has all been eliminated, electrolysis ceases. The compounds of fluorine are antiseptics, useful especially in breweries. Added to cider and sweet wines, sodium fluoride is effective as a preservative. The commercial importance of hydrofluoric acid depends upon the fact that it attacks glass freely, and hence is much used for etching upon glass, the reaction between the glass and the acid being $4HF + SiO_2 = 2H_2O + SiF_4$; the acid attacking the silica of the glass, with the formation of water and a gaseous compound of silicon, known as silicon tetrafluoride. When silicon tetrafluoride is passed into water, it is decomposed according to the equation $3SiF_4 + 4H_2O = 2H_2SiF_6 + H_4SiO_4$; the substance represented by the last term in this equation, silicic acid, separates out as an insoluble precipitate, while the compound H_2SiF_6, known as hydrofluo-silicic acid remains in solution. Hydro fluo-silicic acid forms salts which are known as silico-fluorides. Potassium silico-fluoride, K_2SiF_6, is one of the few potassium compounds that are insoluble in water. The fluosilicates are antiseptics still more powerful than the fluorides. They are not poisonous, have no odor, and a barely perceptible alkaline taste. They are therefore well adapted to use as food preservatives. They are also of use in the surgical dressing of wounds, as they are not irritating and have greater antiseptic power than any dilution of mercuric chloride which is safely non-poisonous.

Liquid anhydrous hydrofluoric acid does not attack glass, but the action is vigorous when traces of water are present. The diluted acid is therefore used in practical etching, the article that is to be treated being immersed in it, after the parts that are not to be attacked have been protected by a coating of wax, or of a special "etching varnish." Hydrofluoric acid in aqueous solution acts very similarly to hydrochloric acid, forming salts which are known as fluorides; hydrogen being liberated when the acid acts upon a metal, and water when upon an oxide.

FLUORITE, or **FLUOR SPAR,** a native fluoride of calcium having the formula CaF_2, crystallizing in the isometric system with cubical habit, and also occurring massive. It has a hardness of 4. and a specific gravity varying from 3.00 to 3.25. It has a vitreous lustre, and is transparent to subtranslucent, varying in color from white through yellow, green, red, blue and brown. The green and violet-blue varieties are most common, and the red is rare. Certain specimens exhibit a bluish fluorescence (q.v.), and the mineral develops differences of electrical potential under the influence of heat and of light. Fluorite occurs in England, Germany and many parts of the United States, and the commercial supply comes from chiefly Kentucky, Illinois, Arizona, Tennessee and New Hampshire. It is a chief source of fluorine and hydrofluoric acid (see Fluorine), and is also used as a flux for promoting the fusion of certain refractory minerals, deriving its name from this latter circumstance (Latin, *fluor*, a flow). Colorless specimens have been used for the manufacture of lenses, for which they are well adapted on account of their small dispersion.

FLUOROSCOPE. See Fluorescence.

FLÜRSHEIM, flürs'hīm, **Michael,** German social reformer: b. Frankfort-on-Main, 24 Jan. 1844; d. 1912. He emigrated to the United States in 1867, and resided there for five years. He then returned to Europe and established an iron foundry in Gaggenau, Baden (1888). After 1892 he lived at Castagnola, near Lugano, Switzerland, engaged in disseminating his ideas through his writings. He believed private property is the cause of immense wealth to some and profound poverty to others, and advocates the government possession of land. His works are ‘Auf friedlichem Wege’ (1884); ‘Deutschland in 100 Jahren’ (1894); ‘Papst und Sozialreform’ (1891); ‘Der Einzige Rettungsweg’ (1894); ‘Rent, Interest and Wages’ (1891); ‘Clue to the Economic Labyrinth’ (1902); ‘The Economic and Social Problem’ (1909).

FLUSHING (Dutch Vlissingen), a fortified seaport with a rich mediæval history, on the island of Walcheren in the province of Zeeland. Formerly a naval station, it has been since 1867, through canal, railway and steamer, made a centre of commerce and manufactures and the terminal of the steamer route to and from England. Pop. about 18,893. Its chief historical interests to Americans lies in the fact that here, in 15 Dec. 1585, Robert Dudley, Earl of Leicester (q.v.), sent by Queen Elizabeth, arrived with his imposing English fleet and 6,000 "help troops," as allies of the Dutch Republic, in the service of which every one of the military leaders of English and Dutch colonies in America and active from 1609 to 1690 received their training.

In 1586, the seven states of the Republic contributed 10,000 guilders to build a chapel for the 1,000 British soldiers, English, Irish, Scottish and Welsh, who occupied the town until 1616. The chaplains were Episcopalian and Presbyterian, and later Scottish, the first of whom married the daughter of Admiral De Ruyter whose statue is in the town. Despite wars, this church, in which the English language is used, continues to this day. One of its ministers was the Rev. Samuel Megapolensis (1667–89) who conducted the negotiations at the English conquest of New Amsterdam, in 1664, and secured the rights of the Dutch people. Another from 1759 to 1763, was the Rev. Archibald Laidlie: b. 4 Dec. 1727, who was called to the Collegiate (four congregations in one) church, still flourishing on Fifth Avenue in New York city, to preach to the people in English. Despite lawsuits and other opposition, Laidlie served until 1779, dying in that year at Red Hook, N. Y., where, because of his ardent Americanism, he had been in exile from the first British occupation of the city. With his attractive personality he won the ultra-conservative Dutch to the use of the English language, especially since their young people were so numerously flocking into the Episcopal churches. He translated the Heidelberg Catechism from Latin into English and the whole of the Dutch liturgy — largely framed by John Calvin and A'Lasco — and the creeds into English. His achievement was probably the first and most successful of the efforts to Americanize the speakers of other than English. His portrait hangs in the lecture room of the church on 29th Street and Fifth Avenue. On 27 June 1918, ex-President Roosevelt, in addressing the minister of his ancestral Reformed Church in America, advised them to follow Laidlie's example — a process which, since the word "Dutch" was dropped from the corporate name, being now the Reformed Church in America, has been in continuance since 1628. Consult Stevens, ‘Scottish Church in Rotterdam’ (1832) and Griffis, ‘The American in Holland’ (1899).

William Elliot Griffis.

FLUSHING, N. Y., former village on Long Island, now a part of the borough of Queens, New York, on Flushing Creek and on the Long Island Railroad. The new rapid transit lines and tramways afford easy and rapid means of communication with Manhattan. Flushing, at first known as Vlissingen, the Dutch form of the name, was settled in 1645 and about 20 years later the majority of its inhabitants were Quakers. It contains a Carnegie library, a high school, Saint Joseph's Orphanage, the New York Parental School, motion picture studios. It has also chemical works, asphalt works, chicory factories, electric sign manufactories, and several nurseries. Consult Waller, H. D., ‘History of the Town of Flushing’ (Flushing 1899).

FLUTE, a musical wind instrument, consisting of a tube furnished with a number of holes in it for the purpose of varying its sounds. The oldest form of the English flute had seven holes which could be stopped by the fingers, but it had no finger-keys. This was in use till about the beginning of the 18th century, when it gave place to the German flute, an instrument which, in its best form, was over two feet in length, consisted of four pieces fitting into one another, and had six finger-holes for the normal tones, and from 6 to 12 keys for the semi-tones, with a compass of nearly three octaves, counting from middle C upward, the higher octaves being obtained by overblowing. The improvements made on this instrument, by Böhm, a German, acting in conjunction with Gordon, an Englishman, enable the player to perform music on any key, with all the chromatic intervals. The chief improvement consisted in the application of a system of keys, by which several holes could be stopped at one time, by one movement of the finger. The flutes made by Böhm are now taken as the models by most makers in all countries. In modern flutes the number of keys varies. The materials of which flutes are made are box, ivory, ebony, silver, glass, etc. Consult Welch, 'History of the Böhm Flute' (1896); Fitzgibbon, 'Story of the Flute' (1914). See FLAGEOLET; FIFE.

FLUTE SHRIKE, a bright-colored shrike native of Africa, and belonging to the genus *Laniarius*. It emits a shrill whistle, and certain of the species prey upon the small birds of their locality.

FLUTE AND VIOLIN. In 1891 James Lane Allen's 'Flute and Violin,' with its subtitle 'Other Kentucky Tales and Romances,' indicated a new departure in Southern literature. In a sense the author was continuing the work of portraying various aspects of Southern life and scenery begun by George W. Cable, Joel Chandler Harris, Charles Egbert Craddock, Thomas Nelson Page and others. In the first volume of Allen's stories a new province was added — that of the blue grass region of Kentucky. Either because the country itself was richer in its picturesqueness and more romantic in its types of character, or the author himself had a more comprehensive culture and a wider perspective of history, there were a note of idealism in the new volume and a suggestion of the deeper currents of history and of the inner life, than were yet evident in the writings of his colleagues. In this first volume of stories were manifest the same qualities that were to be developed and perfected in 'The Choir Invisible' and 'The Kentucky Cardinal.' The story that was most like that of his contemporaries among Southern writers was entitled 'Two Gentlemen of Kentucky' — an old-time negro and an old-fashioned Southern aristocrat who could not adjust themselves to the post-bellum life of Kentucky. More distinctive of Allen's art is the story of the 'Flute and Violin' with its historical background of the early 19th century and its chief characters, a clergyman-professor in the old Transylvania University, whose inner life found expression in the silver-clear simple melodies of a magic flute, and a boy whose passion for music and for art was utterly incommensurate with the poverty of his life. In the two stories, 'The White Cowl' and 'Sister Dolorosa,' are evidenced all of the author's feeling for nature in her more mystic moods, all of his power to reveal the infinite depths of a struggling soul, and all of his rare visualization of the mystic springs of life. Never outside of the inmost circle of Catholic devotees have the poetry and art and the spiritual appeal of the Catholic Church been more subtly delineated. No American writer has attempted more than Mr. Allen in such stories as these; his failure to achieve perfection of art is somehow more significant than perfection in a more limited field.

EDWIN MIMS,
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FLUTED SCALE. See SCALE INSECTS.

FLUTING, in architecture, one of a series of parallel channels cut perpendicularly in the shafts of columns, particularly Doric, Ionic and Corinthian. It seems probable that this kind of ornament had some relation to the original type; perhaps the furrowed trunk might have suggested the idea. It is, however, a beautiful ornament, which is applied with equal happiness to break the otherwise heavy mass of a Doric shaft, or to obviate an inconsistent plainness in the other orders. When the lower parts of the flutes of a column are filled with a convex bead, they are said to be cabled. The name is also extended to spiral channels, as on columns or balusters. See ARCHITECTURE.

FLUTING MACHINE, a machine for corrugating or crimping sheet metals or the like. It consists essentially of a pair of fluted cylinders, or very broad-toothed gears, set well apart, so that a sheet may be passed between them and corrugated. The distance between the fluted cylinders is regulated by an adjusting screw.

FLUVIO-GLACIAL DEPOSITS. See GLACIO-FLUVIAL DEPOSITS.

FLUX, a substance or mixture added to assist the fusion of minerals. In the large way, limestone and fluor-spar are used as fluxes. In the smelting of iron great attention has to be paid to the fluxes, because on their character depends to some extent the complete separation matter of the ore and form a slag, which must be such that it will combine with the earthy matter of the ore and form a slag, which must neither be too refractory nor fusible. Hence if the ore abound in clay or sulphur, lime or limestone, and possibly sand, must be added; if in quartz, lime and clay are requisite, otherwise the quartz is slagged by combining with part of the iron, which is thus lost. Frequently ores are so selected that the earthy matters present may flux each other, but this requires skill and experience. The fluxes used in pottery are very various and are distinguished by different names; but they almost all consist of litharge or red-lead, with sand or boracic acid, sometimes singly, sometimes together. They are, therefore, essentially colorless glasses used as vehicles for infusible colors. See COPPER; IRON; etc.

FLUX OF LIGHT. See PHOTOMETRY.

FLUXION, fluk'shŏn, (1) in medicine, an unnatural flow or determination of blood or other humor toward any organ; a catarrh. (2) In mathematics, a method of calculation resulting from the operation of fluents, or flowing numbers. Thus a mathematical line may be considered as produced by the fluxion or flowing of a point; a surface by the fluxion of a line, and a solid by the fluxion of a surface. A mathematical point in motion will really make a line; a revolving radius which is a line will make a circle which is a surface, and its revolution about its diameter will generate a sphere which is a solid. The same principle may be applied to purely numerical calculations, like the formulæ of algebra. This branch of the higher mathematics was invented by Newton in 1665. In 1676 he communicated his method to Oldenburg in a sentence with all the letters disarranged so that his correspondent could not possibly have put them in order. If he had succeeded in doing this the sentence would have been *Data æquatione quotcunque fluentes quantitates involvente fluxiones invenire et vice versa.* [«Given it makes no matter how many equations involving fluent quantities, fluxions are to be discovered, and the reverse is true» (that is, where fluxions occur the fluents are to be found).] Leibnitz received this letter in 1677, and in 1684 explained a discovery which he had made. It was that of the differential calculus, which was essentially the same as that of fluxions. What Newton called fluxions, Leibnitz called differences. An angry controversy subsequently arose between Newton and Leibnitz as to the priority of discovery, the Royal Society of London taking the part of the former, who was then its president, and the scientific men of Germany that of the latter, who was their countryman. Both appear to have made the discovery independently. In the slight differences of method which exist, the advantage lay with Leibnitz, and while the term fluxions is now scarcely ever used, that of differential calculus is in common use. The first elementary treatise on fluxions published in England was by John Harris in 1702. A description of the process by Newton himself followed in 1704, in his ‘Quadrature of Curves.’ See MATHEMATICS.

FLY, an insect. See DIPTERA; FLIES; and the names of various groups and species of flies.

FLY, Spanish. See BLISTER BEETLE.

FLY-BLISTER, a collection of blood-serum between the layers of the skin, caused by the application of some preparation of the Spanish fly. It is used to extract fluid from underlying tissues, and to cause desired changes in local circulation. Absorption from applications sometimes takes place, giving rise to the irritation and inflammation of the kidneys, bladder and genital organs which chracterize the drug when taken internally. See BLISTER-BEETLE.

FLY-CASTING, the art of throwing an artificial fly in angling. (For the various methods employed see ANGLING). Aside from its use in actual fishing the art is employed by some in competitive contests, and «national tournaments» are held annually in both Great Britain and the United States, sustained by a federation of clubs devoted to the sport, in which the championship and prizes are competed for.

FLY-UP-THE-CREEK, a local name for the little green heron (*Ardea virescens*), a common bird throughout eastern North America. See HERON.

FLY MUSHROOM. See AMANITA; FUNGI.

FLY RIVER, a considerable stream in New Guinea (British) which has its source in the Victor Emanuel Mountains and empties into the Gulf of Papua. Its length is 350 miles. There is a delta at the mouth of Fly River in which lies the island of Kiwai.

FLY WEEVIL, a local name of the *Gelechia cerealella* or grain moth of the United States.

FLYCATCHER, one of many birds which catch insects in the air. More restrictedly, in ornithology, birds of the Old World insectivorous family *Muscicapidæ,* allied to the thrushes; this is a group very difficult to limit or define. All these are small, active birds, with great activity in flight and skill in seizing their agile prey; and all have broad flattened beaks, at the base of which is a growth of long stiff rictal bristles. The feet are usually weak and the wings long and pointed. Four or five species are common summer visitors to Europe, including the familiar and typical spotted flycatcher (*Muscicapa grisola*) and the pied or blackcap (*M. atricapilla*). In all the hotter latitudes of the Old World the species are very numerous, and ornate, many being crested, or having, in the case of the males at least, very long tail-feathers, which are handled most gracefully. Such are the paradise flycatchers (genus *Tersiphone*) of India and eastward, the Japanese species of which is so commonly represented on painted or embroidered screens. The «fantail» (q.v.) is another species remarkable in its flight. Most of these flycatchers are birds of the woods, and are usually solitary and silent, feeding on little except insects, which are habitually caught upon the wing with an audible snap of the bill. Some of the smaller ones are sometimes called «fly-snappers.» They nest in various situations, and many make highly beautiful receptacles for their variously decorated eggs.

None of the muscicapids is to be found in the New World, but America has a large family of flycatchers (the *Tyrannidæ*) just as suitably so-called as are the others, so far as habits are concerned; nor are they far removed in structure. This family contains some 400 species, mainly tropical, and chiefly of an olive-green, or black-and-gray complexion, often with ornamental touches of scarlet on the head or wings. The bill is rather stronger as a rule than in the Old World flycatchers, and often decidedly hooked, like that of vireos or shrikes. The wings are usually short, and the tail varies greatly, sometimes being beautifully prolonged, as in the scissor-tailed flycatcher of the western United States. The genus *Alectrurus* presents still more striking examples of very long and beautifully modified tail plumes. Good examples of this group are the king-birds, pipiris, pewees, vermilion flycatcher, and scissor-tail, elsewhere described. An excellent general account of these families will be found in Evans' ‘Birds’ (London and New York 1900).

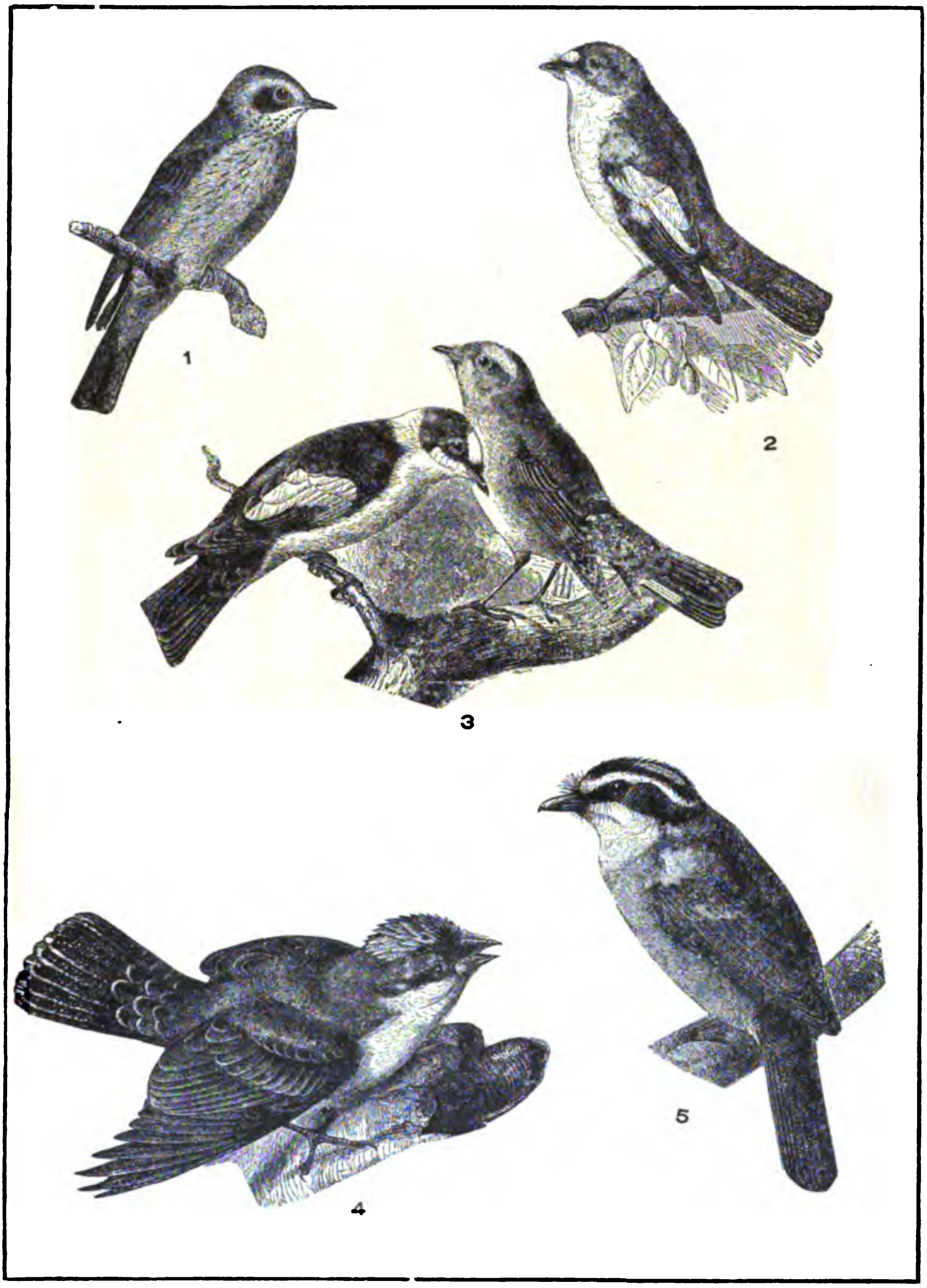
ERNEST INGERSOLL.

FLYING BOAT. See AERONAUTICS.

FLYING BRIDGE. See BRIDGE; MOVABLE BRIDGES.

FLYING BUTTRESS, a construction by means of which the thrust of a vault or arch is

FLYCATCHERS



1 Spotted Flycatcher
2 Pied Flycatcher
3 White-collared and Red-breasted Flycatchers
4 Kingbird
5 Bienteveo

carried across an open space to a buttress (q.v.). Nearly every instance of the use of the flying buttress is in connection with Gothic architecture, and some of the earliest forms are very curious and illustrate well the growth of the style. The "high vault" over the nave or choir should have a buttress on each side to resist its thrust, but to build one there would be to obstruct the aisle on either side, which it was important to leave open and free as a part of the great interior of the church. The buttress, therefore, was built outside of the aisle, where it took up the thrust of the aisle vault and was made much larger than necessary for that purpose so as to receive also the thrust of the high vault, which was transmitted to it by means of a sloping bar of stone carried on a separate arch or half-arch. This bar and half-arch taken together form the flying buttress. In large churches the flying buttress is sometimes double or twofold, leaping over two aisles, or an aisle and a row of chapels; and again it is sometimes repeated in height, one flying buttress coming above another.

FLYING COLUMN, in military organization an independent corps of troops usually composed of all arms and assigned to a particular task. Mobility is always the prime consideration, and a minimum of baggage is taken along. Such a force is at almost all times acting apart from its first base of operations and is only employed on occasions of very great necessity, such as the relief of garrisons in distress, or to obviate some move of the enemy, or to cut off some of his supplies, etc. Flying or mobile columns were extensively employed by the British in the war in South Africa in 1899–1902.

FLYING DRAGON, a flying lizard (q.v.) of the Oriental genus *Draco.*

FLYING DUTCHMAN, a phantom ship said to be seen in stormy weather off the Cape of Good Hope, and thought to forebode ill luck. One form of the legend has it that the ship is doomed never to enter a port on account of a murder committed on board; another, that the captain, a Dutchman, swore a profane oath that he would weather the Cape though he should beat there till the last day. He was taken at his word, and there he still beats, but never succeeds in rounding the point. He sometimes hails vessels and requests them to take letters home from him. The legend is supposed to have originated in the sight of some ship reflected from the clouds. It has been made the groundwork of one or two novels and of Wagner's opera 'Der Fliegende Holländer.'

FLYING DUTCHMAN, The. A romantic opera in three acts by Richard Wagner, who also wrote the book, first produced at Dresden, 2 Jan. 1843, under the bâton of the composer and with Mme. Schroeder-Devrient as Senta. Although measured by Italian opera standards, Wagner may not have been an extremely rapid worker, he composed this entire opera, except the overture, in seven weeks. To the public, which had looked for another "Rienzi," the production was a disappointment, and after a few performances it was withdrawn and not again heard for 10 years. The legend upon which the story is based was a familiar one and the idea of using it came to Wagner during a storm which had overtaken him in his voyage from Riga to Paris. The Flying Dutchman, compelled to sail the seas without a rest until he finds a maiden who will be faithful unto death, meets Senta, daughter of a Norwegian captain, who is betrothed to Erik. She is romantic and imaginative and fascinated by the story of the Dutchman, becomes convinced that she is destined to save him. She is reproached by Erik for her faithlessness and the stranger, overhearing this, fears that she will prove untrue to him and decides to leave. As he sails away, Senta rushes to the cliff and hurls herself into the sea. The phantom vessel sinks, the waters grow calm and in the distance the two are seen rising transfigured into the heavens. With this work, Wagner broke finally the bonds of tradition and started his uniquely individual series of music dramas. While there are still many instances of the conventional operatic forms — for example, the sailors' chorus, the duets between Senta and Erik and Senta and the Dutchman, the spinning song, Senta's ballad — there are significant manifestations of the Wagner of the future. The overture is a brilliant example of dramatic puissance and the opening solo of the steersman, followed by the storm and the appearance of the phantom ship, the Dutchman's solo in the first act, the choruses in the last, are true and worthy expressions of the composer's genius. The system of leading motives is also found here in embryo. In the realism, the richness and the variety of the instrumentation are also evidences of the greater Wagner. But, viewed as a whole, 'The Flying Dutchman' is a work of promise, not of attainment. Its interest today is historical, rather than musical. The first American performance took place at the Academy of Music in New York, 26 Jan. 1877, with Clara Louise Kellogg as Senta. The first German performance followed 12 March 1877 with Eugenie Pappenheim in the same rôle.

Lewis M. Isaacs.

FLYING-FISH, a fish able to leave the water when alarmed or pursued, and sustain itself for several seconds in the air. In tropical seas the flying-fish rise from the water in flocks, or, more properly, shoals, of many thousands at a time, when disturbed by the passing of a ship, or pursued by such foes as the bluefish and albicore. They spring from the crest of a wave, and, darting forward, plunge into another to wet the membrane of the fins, and in this manner continue their flights for several hundred yards, often pursued by marine birds in the element to which they are driven for protection against the tyrants of their own. The sole motive power is the propulsion obtained by the work of the tail in giving the rushing leap from the water; but the great pectorals act to some extent as supporting air-planes. In all the species belonging to the genus *Exocœtus* (which is typical of the family *Exocœtidæ*, allied to the sauries); the pectoral fins are very much developed, and the superior lobe of the caudal fin shorter; the head and body are invested with large soft scales, and the body has a ridge or carina extending longitudinally along each flank, which gives it somewhat of an angular appearance. The head, when viewed from the front, is triangular; the eyes and air-bladder are very large. Flying fish are inhabitants of every temperate sea, though abounding in the vicinity of the equator. In length they rarely exceed 13 inches, and are commonly found about eight. The flesh is pleasant. Several species are described by naturalists, some of which have very long fleshy filaments depending from the lower jaw, the use of which is not known. The *Exocœtus volitans*, or common flying-fish of the Atlantic, is also known in Pacific waters; and the coast of California is visited by a large species, 18 inches long (*E. californicus*) called *volador* by the Spanish fishermen. About 65 species are contained in this and other genera, among which is *Fodiator*, with at least one common flying-fish (*F. acus*), distinguished by sharpness of its snout. Another sort of flying-fish is the gurnard or sea-robin (q.v.).

FLYING-FOX, or FOX-BAT, one of the great fruit-bats (q.v.) of the Oriental region; specifically the kalong (*Pteropus edulis*), which is regarded as good food by the people of Java and neighboring islands. It is the largest of known bats, measuring five feet in expanse of wings, has rusty red fur, woolly upon the neck, and a long pointed fox-like muzzle, short, triangular ears and large eyes. These bats belong to a very large widespread genus, and have the general characteristics and habits of the fruit-bats (q.v.). The name is also sometimes applied to the flying-lemur or colugo (q.v.).

FLYING FROG, a Malayan tree-dwelling frog of the genus *Rhacophorus*, which has large webbed feet with adhesive dicks. Some 40 species are known in various parts of the tropics, one of which was believed by Wallace to sail down from trees in a long slanting flight; but there is no direct evidence of it as to any species. A full account of the varied habits of the genus will be found in Gadow's 'Amphibia and Reptiles' (1901).

FLYING-LEMUR. See Colugo.

FLYING LIZARDS. Various lizards are provided with something more or less elaborate in the way of a parachute assisting them in springing from branch to branch, and perhaps in frightening off would-be enemies. Thus a Malayan gecko (*Ptychozoon homalocephalon*), about eight inches long, with membranous expansions along the sides of the neck, body, tail and limbs, which are supposed to enable it to make long, sliding leaps; but its habits are very little known. The term applies especially, however, to the East Indian "flying-dragons" or showy lizards of the genus *Draco*, which have loose folds of skin distensible by the erection of several movable ribs, and spread as a parachute. There are various species, harmless, pretty and tamable.

FLYING MACHINE, a device for enabling man to navigate the air. The feat of flying has often been attempted; even among the ancients it was tried, and succeeded to some slight extent. Friar Bacon affirms in his writings that this feat is not only possible, but he also informs us that he himself knew how to construct a machine in which a man, in a sitting position, might be able to transport himself through the air like one of the feathered tribe. The secret of Friar Bacon consisted of a very simple mechanical contrivance. It was a pair of globes made of hollow copper, exhausted of air, on which a chair could be supported, by which means a man could float in the atmosphere above the earth, and could buoy himself along. Another friar asserts the truth of this invention, or, at least, of one similar. Father Francisco Lana declares that a round vessel of plate-brass, 14 feet in diameter, weighing three ounces per square foot, will only weigh 1,848 ounces; whereas a quantity of common air of the same bulk will weigh 2,155⅔ ounces; consequently he deduces the fact that the globe will not only be sustained in the air, but that it will be capable of supporting a weight of 37⅔ ounces; and also that a globe of the same weight, but greater in capacity, would support a man. This, however, is a fallacy; for, from the fact of nature abhorring a vacuum, the globe would be crushed in by the superior force of the atmosphere. At many periods this subject has been taken up by philosophers, particularly in the reign of Charles II. See Aeronautics; Aeroplane.

FLYING MOUSE. See Phalangers.

FLYING-ROBIN. See Flying-Fish.

FLYING-SQUID, a squid of the genus *Ommastrephes*, having two large lateral fins, which enable it to leap so high out of the water that sometimes these mollusks fall on ships' decks. See Squid.

FLYING SQUIRREL, a tree-dwelling squirrel having the skin along the sides of the body between the fore and hind legs loose and capable of being drawn out by extending the legs, so as to form a parachute, enabling the animal to take long, sailing leaps. The fur is peculiarly soft and dense and the tail is long, flat horizontally and broadly furry. The two North American species are the common eastern squirrel (*Sciuropterus volucella*) and the northern one (*S. sabrinus*). The former is to be found from Maine to Florida, and westward to the treeless plains, but is rarely visible during the day, when it remains hidden in some hole in a tree, going out at dusk in search of food, which consists of buds, nuts, insects, etc., like other squirrels. In such a hole the family dwells in winter, snugly bedded in fur and other soft materials, and having a store of nuts laid up near by; but most of the time in the colder part of its range is passed in sleep. Occasionally in summer an old bird's nest is converted into a cooler home. When abroad these squirrels creep about the trunks of trees, and take large slanting leaps, some of nearly 30 yards from higher to lower points, swinging up gracefully to their alighting. They can make little if any change of direction in these glides. The common eastern species measures about nine inches, and the tail and additional four inches. It is bluish-gray tinged with brownish or buffy. Throughout Canada, as far north as forests extend, lives a larger species (*S. sabrinus*), which is glossy wood-brown above and white below, becoming sooty-drab in summer. It has similar habits to the other. Dwelling in winter in warmly furnished holes made by woodpeckers, as a rule, and in summer constructing globular nests of twigs and leaves. A variety (*alpinus*) is peculiar to the Rocky Mountains. Several other species of this genus inhabit Asia and northern Europe, one also occurring in India.

Siberia has a species of the genus *Ptromys* which is 18 inches long in body, and has a tail exceeding this length. Its parachute extends from the hind leg to the tail. Another species (*Eupetaurus cinereus*) is confined to the high Himalayas, and subsists principally on moss. A more remote family (*Anomaluridæ*, the scaled squirrels) in Africa contains several species with similar power of flight.

FLYNT, Josiah. See WILLARD, JOSIAH FLYNT.

FLYSNAPPER, a remarkable bird (*Phainopepla nitens*) of the southwestern United States, which belongs to the wax-wing family (*Ampelidæ*), but has the shy yet active movements of a flycatcher with a habit of jerking its tail. The male is shining bluish-black, with white wing-quills and vent, and a noble crest; his mate is gray-brown and white. It catches insects on the wing, by leaping from its perch and snapping at them noisily; but also eats mistletoe berries, etc. It makes a shallow nest in a low tree and lays eggs with dark dots about the small end. The term «flysnapper» is also given to some of the smaller flycatchers (q.v.).

FLYWHEEL, a wheel designed to preserve or store momentum, as in a machine which is called upon to do considerable work set at intervals. It is always made with a heavy rim, and as it acquires speed its inertia assists its maintaining that speed, so that any sudden demand for extra power is available, and any tendency to run away or «race,» because of sudden release of load, is avoided. It affords a simple means of overcoming a dead centre, and of balancing a machine subject to irregular demands. The principles of the fly-wheel are those of inertia and centrifugal force. It is well known that a rotating body tends to continue its motion and resist any change either of acceleration or retardation. The heavier it is and the larger its diameter and speed the more it resists a change, because of its inertia. It is thus apparent that a heavy fly-wheel may be speeded gradually, and then becomes a store of energy, so that if there is a sudden demand for an excess of power, with no noticeable change of speed, as when a heavy press comes together to stamp metal, the mechanism moves continuously, without the stopping or jerking which would occur if there were no attached fly-wheel. It may be called an equalizer of load. Fly-wheels for steam-engines were formerly built very large and heavy, but rather numerous bursting accidents caused closer investigation of the strains to which they were subjected. In Benjamin's tests it appeared that cast iron fly-wheels might burst at from 190 to 425 feet per second speed of rim. It is now, therefore, deemed unsafe to design a cast iron fly-wheel to run faster than 100 feet rim-speed per second. Cast steel, however, is made that will safely sustain a speed of 230 feet per second. Well-made wooden fly-wheels are considered safe at 150 feet per second speed. It has been found convenient in transmitting power to utilize fly-wheels for carrying belts, and very large wheels with heavy belts are so employed in many factories. A steam-engine driving a lot of heavy machinery would «race» or run away when a number of the machines were disconnected suddenly, if it were not for the fly-wheel, that equalizes conditions. The four-cycles combustion engine cannot be operated at all without a fly-wheel, as it explodes only once in four revolutions. See STEAM AND STEAM-ENGINES and INTERNAL COMBUSTION ENGINE.

FO, the name given by the Chinese to Buddha. See BUDDHISM.

FOA, fōä, **Eugénie,** French author: b. Bordeaux 1795; d. 1853. Her maiden name was Fradis, and she was of Spanish-Jewish descent. Separated from her husband she supported herself by her pen, often writing under the name «MARIA FITZCLARENCE.» Her tales for young children are delightfully clever. Notable among her works are ‹Les Mémoires d'un Polichinelle› (1839); ‹Le Petit Robinson de Paris› (1840); and ‹Le Vieux Paris› (1840).

FOAKES-JACKSON, Frederick John, English theologian: b. Ipswich, 10 Aug. 1855. He was educated at Eton and at Trinity College, Cambridge. He was ordained in 1879 and from 1897 to 1912 was examining chaplain to the bishop of Peterborough. He became honorary canon of Peterborough in 1901, and from 1882 to 1916 was lecturer at Jesus College, Cambridge, where he was dean after 1895. In 1916 he was Lowell lecturer at Boston and in the same year became Briggs professor of Christian institutions at the Union Theological Seminary, New York. He published ‹History of Christian Church to A.D. 337› (1891; 6th ed. to A.D. 461, 1914); ‹Christian Difficulties in the Second and Twentieth Centuries›; ‹A Biblical History of the Hebrews› (1903; 3d ed., 1910); ‹Biblical History for Schools› (1912–13); ‹St. Luke and a Modern Writer› (1916) and contributions to the *Athenæum*, *Church Quarterly*, *Cambridge Review*, Hastings' ‹Dictionary of Religion and Ethics,› *Harvard Theological Review*, etc.

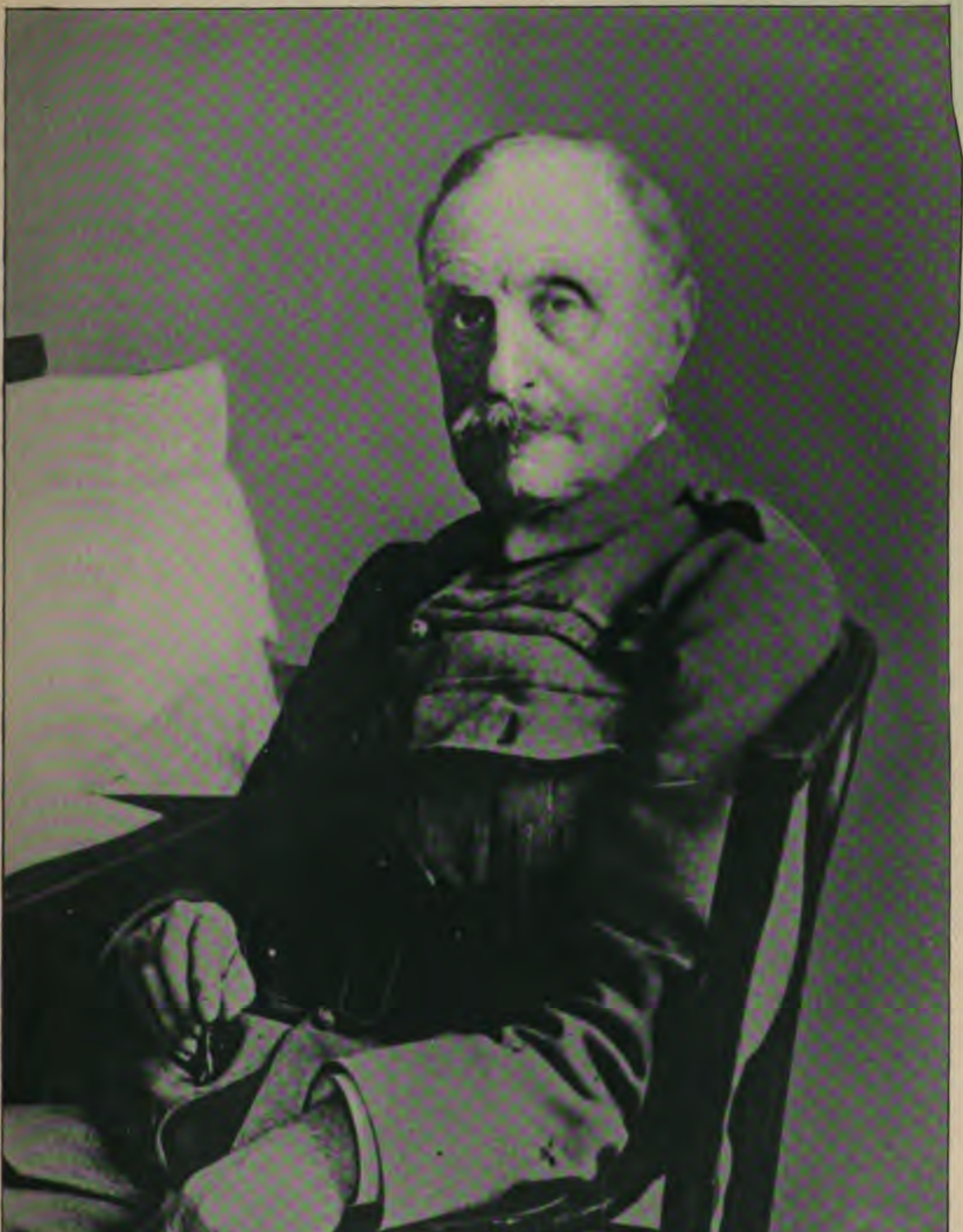
FOCA, fōt'chä, Bosnia, town situated at the confluence of the Cehotina and Drina rivers, near the frontier of Montenegro. It is surrounded by wooded mountains and contains several beautiful mosques, which are the most ancient in Bosnia. Its only industries are silver filigree-work and inlaid weapons. It was the scene of many conflicts during the Middle Ages and in the 14th century became one of the principal trading stations of the Ragusans and in the 16th century was the seat of the Turkish governor of Herzegovina. Pop. 4,500.

FOCH, fōsh', **Ferdinand,** French marshal, «the hero of the Marne»: b. Tarbes, department Hautes-Pyrénées, 2 Oct. 1851, within a few miles of, and only three months before his illustrious colleague, Marshal Joffre. Of Basque descent, his father, Napoléon Foch, was a civil servant under Napoleon III. One of his brothers, a lawyer, also bears the martial name of Napoléon, and the other is a Jesuit priest. The three brothers received their early education together at the local college, and then turned each to his respective vocation, the Church, the Army, and the Law. The strongest points in the mental composition of Ferdinand Foch were geometry and mathematics. He entered the Polytechnic School and graduated as an artilleryman. At the age of 19 he served as a sub-lieutenant in the Franco-German War, and at 26 had won his commission as a captain of artillery. Rising to lieutenant-colonel, he was appointed professor of strategy and general tactics at the École de Guerre (War College). After five years he returned to his regiment, held various commands for several years, and then went back — a brigadier-general — to the War College as Director. This high position, conferred upon him without being sought, by Premier Clemenceau, brought him into close and confidential contact with the War Department. About this time a small but serious band of French officers was formed, men then unknown to the outer world and hardly even recognized in France, but whose names have since become celebrated in military history — Joffre, Castelnau, Pétain, Nivelle, Foch and a few others. Each realized that France would some day be called upon to face an ordeal like that which confronted her in 1870, and each toiled strenuously to prepare himself and his colleagues against the day. They had not forgotten the lessons of Gravelotte, Metz and Sedan. For his part, Foch devoted his energies to training and teaching officers. For years his two great works, 'The Principles of War' and 'The Conduct of War' (translated into different languages) had been highly prized by military students both in Europe and America. But Foch was a preceptor of a new type; he laid equal stress upon the philosophical as upon the material aspect of war; he did not regard war as an exact science, but rather as a condition in which character or *morale* counted for as much as strategic and tactical skill. On the other hand, he possessed a deep knowledge of the mechanical details of war machinery. Dressed in workman's overalls, he would spend months at a time going around the famous Creusot cannon works, experimenting, watching, testing and analyzing. After leaving the War College Foch commanded successively the 13th Division, the 8th Corps at Bourges, and the 20th Corps at Nancy. The European War gave him the first opportunity of putting his theories into actual practice; destiny called the professor from the lecture room to demonstrate his teachings on the field of battle, and it was in the most thrilling and momentous event of the war that he justified them and distinguished himself.

At a critical moment of the battle of the Marne General Foch, commanding the 9th French Army, was informed by his airmen that a gap had been left in the alignment of the German armies between von Hausen's right and von Buelow's left. In the night of 8 Sept. 1914, he thrust his left wing behind von Buelow's exposed flank and pushed his right wing forward; by dawn next morning he had driven a wedge between the forces of the two German commanders. After a fierce battle he drove two corps of von Buelow's right into the muddy marshes of Saint Gond and made the largest Allied capture of prisoners and guns up to that date. Von Buelow retreated, closely pursued by Foch, whose right meanwhile harassed von Hausen and threw him back upon Châlons. Within a few hours the whole German line was in full retreat. The Allied victory at the Marne was due, according to most military critics, to the error of von Kluck in exposing his flank and, secondly, to the swift decision and prompt action of General Foch in recognizing that error and seizing the advantage. Up to that moment of the battle the 9th Army had suffered severe punishment; with a force already more than half defeated, Foch passed to the offensive and accomplished what appears almost a miracle. Altogether he had no more than 120,000 men in his command to oppose some of the finest German troops, who were stated to have numbered 200,000. At the battle of Ypres General Foch was in control of the successful operations by the French, British and Belgians which prevented the enemy from breaking through to Calais. In May 1917 he succeeded General Pétain in Paris as Chief of the Staff of the Army, and in March 1918, during the great German offensive on the Western front, the grim logic of events dictating the necessity for a unity of command, General Foch was nominated supreme commander of the French and British armies on that front. On 28 March 1918, the commander of the United States forces in Europe, General Pershing, placed the whole strength of the American army in France at the immediate disposal of the Generalissimo. The combined strategy under his command culminated in victory. On 8 Nov. 1918 he received the German commission empowered to negotiate for an armistice which was signed 11 Nov. 1918. (See War, European — Battle of the Marne; Battle of Ypres). Consult Johnston, Major R. M., 'General Foch, the Man of the Hour' (New York 1918); Le Goffic, C., 'General Foch at the Marne' (New York 1918).

FOCUS (plural foci), a word introduced into science by Kepler in 1604. It literally means a hearth round which all the members of a family gather, and takes the acquired meaning of the centre, into which certain activities are gathered. In optics it denotes the point at which divergent rays of light are brought to meet again, and from which they appear to proceed. The principal focus of a lens is the focus of rays falling upon the lens in a line parallel to its axis. The conjugate foci of a mirror or lens are two points so situated that the rays emitted from a light, or a luminous object, at either point, are reflected or refracted to the other. In photography the word is familiarly used of the image reflected on the screen of ground glass, which is said to be in focus when it is fixed at a true focal point, and so as to procure a focal or undistorted effect. It is also used of the lens, with regard to its distance from the screen of ground glass. The lens is in focus when it transmits to the screen an image without blurring or aberration. The term is employed in geometry in the description of the ellipse, which has two foci, of which it can be proved that the sum of the distances of any point of an ellipse from its foci is constant, and the difference of the distances of any point of a hyperbole from its foci is constant. See Ellipse; Lens; Light; Mirror; Optics.

FODDER (A. S. *fódor,* cog. with Ger. *futter*), the food collected by man for the use of the domestic herbivorous quadrupeds. In English the term is commonly restricted to



FERDINAND FOCH

Generalissimo of the Allied Armies in Europe (1917-   )

dried herbage, as hay and straw; but in other languages it is more comprehensive, and includes all the food of cattle, except what they gather for themselves in the field. The principal part of the food of the domestic herbivora is furnished by grasses, most of which are eaten by them when fresh and green. Besides the supplies which they receive of the surplus of corn cultivated for human food, they are also, to a considerable extent, dependent on the straw or dried herbage of the corn-plants for their winter provender; and that of many other grasses, cultivated on this account alone, is converted into hay for their use. Hay, being cut and rapidly dried while the plant is still full of sap, contains more nutritious matter than the ripened straw of the cereals. In the United States the best grasses are timothy, red top or Rhode Island bent, white top, orchard grass, and June grass or Kentucky blue grass. In California the best fodder grass is the alfalfa of which three or even four crops a year are obtained.

Next to the grasses are ranked the *Leguminosæ,* affording food for cattle in their seeds — as beans, peas, lentils, lupines, etc.— and in their herbage, on account of which many of them are cultivated, as clover, lucerne, vetch, tares, sainfoin, etc. When consumed green, the produce of these crops is usually termed forage or green forage (See SILAGE). Some of them enter also largely into the composition of hay, being cut and dried with the grasses along with which they have been sown. Some of the *Cruciferæ* are cultivated to a considerable extent as forage-plants, cattle being fed on their green herbage, although they are not suitable for drying as fodder. Among these are kale and cabbage, rape, etc. In some parts of the world cattle are not unfrequently fed on the leaves of trees, as in the Himalayas, where the leaves of different species of Aralia, Grewia, elm and oak are chiefly employed for this purpose, and are collected, dried and stacked for winter fodder. In seasons of drought in India cattle are kept alive on the green leaves and pods of acacia and *Inga dulcis.* See ALFALFA; CLOVER; GRASSES; HAY; PASTURE; etc.

FODDER, Green. See SILAGE.

FODERÉ. See PRADIER-FODERÉ.

FODIENTIA, the aard-varks (q.v.); also EDENTATA.

FŒDERA, fĕd'ĕr-a, name given to a collection of state documents bearing on transactions of the kings of England and other states from 1100 to 1654. Thomas Rymer compiled 15 volumes in 1693–1713 and the work was continued by Robert Sanderson from 1715 to 1735. Rapin compiled a French abridgment of the work and Stephen Whatley's 'Acta Regia' (1731) is a translation of the latter.

FOEHN (fĕn) **WIND,** a warm wind that blows from the Alps in some of the northern valleys of Switzerland. At one time the *fœhn* was supposed to be an air-current that had been warmed by passing over the Desert of Sahara. Now it is known that the *fœhn* is warm because it is a south wind which, robbed of its moisture by expansion and cooling in passing over the Alps, is warmed by compression in descending through the increase of atmospheric pressure with decreased altitude. It corresponds to the Chinook wind of Montana, Washington and British Columbia. See CHINOOK WIND.

FŒNICULUM. See FENNEL.

FŒTUS, fē'tus, an unborn child, or unborn young of an animal. In the human fœtus the growth is most pronounced after the fourth month. The convolutions of the brain, distinguishable organs of sex, ossification and muscular movement advance in the fifth month, during which nails and hair appear. During the sixth month the pubic bones ossify, eyelids and eyelashes form, fat develops under the skin. In the seventh month, the fat increases, the eyelids are open. During the eighth month the nails are fully developed, and the normal fœtus attains a weight of from five to nine pounds. See also EMBRYO.

FOG, a very thick mist; small hollow vesicles of water suspended in the air, but so low as to be but a short distance from the earth, in place of rising high above it and becoming so illuminated by the sun as to constitute clouds of varied hue. Fogs often arise when the air above warm, moist soil is colder than the soil itself. The hot vapors from the ground are then condensed by coming in contact with the colder air above, as the warm steam of a kettle is by the comparatively cold air of a room. But no fog arises till the cold air has absorbed vapor enough to bring it to the point of saturation. Fogs often hang over rivers. Their cause is the condensation by contact with the cold water, of the vapor in a hot and moist air current passing over the river. The «pea-soup» fogs of London life are produced by the carbon of the smoky atmosphere coloring the fog vesicles; a fog which is brown in London's business district is generally white a few miles off, and wanting altogether at the further extremities of the city. On hills and mountains of any size it is easy to rise above a fog, and see it like an ocean beneath one's feet. Ocean fogs are dangerous to vessels traveling at high speed, as in the case of the *Titanic* disaster in 1912. Where cold-water currents underlie warm air, a common condition off the Newfoundland banks, the formation of fog is often rapid and dense. Such fogs persist after the temperature has altered, and also the fog drifts with the wind; it is therefore a most uncertain quantity. It has been noted that electric potential is very high during a fog. Consult McAdie, «Fog Studies» (in 'American Inventor,' Vol. IX, p. 209, 1902).

FOG-SIGNALS, signals given by means of sound or light to warn vessels of danger during fogs. Various kinds of fog-signals are used, among which may be mentioned bells, drums, gongs, guns, compressed-air whistles, steam-whistles and fog trumpets or horns, and latterly powerful electric flashlights. Gongs are not very powerful as signals, often failing to be heard at more than the distance of a quarter of a mile. Bells may be heard during fogs at a distance of from one to three miles. Guns have been heard as far as 10 miles, with a light breeze blowing across the sound. One of the most powerful signals is the siren fog-horn, the sound of which is produced by means of a disc perforated by radial slits made to rotate in front of a fixed disc exactly similar, while a long iron trumpet forms part of the apparatus. The disc is made to revolve rapidly, and when the slits are opposite each other openings are formed through which electricity, steam or compressed air is forced. This causes a sound of very great power, which the trumpet collects and compresses, and which under favorable circumstances is heard from 20 to 30 miles out at sea. Fog-signals are also used on railways during foggy weather. They consist of cases filled with detonating powder, which are laid on the rails and exploded by the engine when it comes up to them. Bell-buoys, common to the coast of the United States, are operated by the current, by the ebbing and flowing tide, by the swaying of the waves, by the wind and by clockwork impelled by weight or spring. As to construction, they are adapted for anchorage on spits, sand-bars, or shoals. The use of electricity in fog-signals is well illustrated at Sandy Hook, N. J., where a powerful searchlight flashes every few moments in varying directions. In clear weather this flashlight can be observed a distance of 50 miles at sea. There are in the United States under government control nearly 10,000 fog-signals of all kinds, 3,000 of which are lighted.

Germany erected in 1903 a fast flashing light on the island of Helgoland in the North Sea. The system or principle employed is said to be entirely new. Not only that, but it was said to present absolutely insurmountable difficulties. The revolving light on Helgoland is not only the largest in the world, it is the most unique, for Germans claim that it never had a model.

They built upon the superiority of the German reflector, with its exactly parabolic ground-glass mirror or speculum, and the marvelous success of the Helgoland fast-flashing light has justified itself. In these lines, for a long time, France was in the lead. The reflector invented by Schuckert, with its parabolic mirror, has earned a place by the side of the world's very best work. The bright fires — *feux éclairs* — of the system, based upon a combination of Fresnel lenses and totally reflecting ring prisms, which were built by the French with marvelous skill and accuracy, blocked the way to the new lights. About the middle of the 90's German experts were sent to France by the German Imperial government for the express purpose of studying flashlights. The experts stayed long enough to find out all that was best in the French system, aided thereto by the kindness of the scientific men of the republic. Before their return they were convinced that by means of two or more reflectors, erected upon a reflector with Schuckert's glass parabolic mirror, results equal to those of France could be produced.

Experiments were made in Nuremberg. They went far beyond what the most sanguine had believed possible. The revolving reflector of the German apparatus was fully equal to the Frenchman's revolving light. As soon as the experts had demonstrated their point, work was begun on a light reflector or projector equal to the largest ever used. It was to represent 30,000,000 candlepower and to last no longer than one tenth of a second. The flashes must follow each other every five seconds. When the weather is favorable the beams go far beyond the central fires of light rays. On the first night that the new light was used, its peculiar, flashing beams were seen by people standing on the mole at Busum, a distance of 65 kilometers, or a trifle over 40 miles. The watchers in the lighthouse at Amrum, about the same distance, were able in unfavorable weather to see the same beams as they rapidly appeared and disappeared. It was noted that the otherwise bluish-white light of the electric arc appeared red. Attempts, which are still in the stage of experimentation, are being made by means of radiography to ascertain position in fogs, and to determine direction and distances in fog by means of radio signals. The unreliability of sound waves in a medium like air, which is not of uniform density, and thus give rise to "silent zones," add an element of uncertainty to all apparatus so far invented. See BUOY; ELECTRIC LIGHTING; FOG; LIGHTHOUSE; MEGAPHONE; SIREN; TOPOPHONE.

FOGARASSY, János, yän′ōsh fŏ′-gä-rŏsh-ĭ, Hungarian lawyer and philologist: b. Käsmark in Austria-Hungary, 1801; d. 11 June 1878. He studied at Sáros-Pátak and was graduated in law, became an advocate, and was appointed to an office in the government bureau of finance. His principal claims upon the memory of posterity are his legal works written in the Hungarian tongue. He also published a 'Hungarian Dictionary' (1836), and began, at the suggestion of the Hungarian Academy, a complete dictionary of the language in collaboration with G. Ezuczor, after whose death he finished the work single-handed. It was published in 1861, and for this achievement he was awarded a gold medal by the Academy.

FOGAZZARO, Antonio, ăn-tŏ′nē-ŏ fō-gä-tsä′-rō, Italian novelist and poet: b. Vicenza, Italy, 1842; d. 1911. He is by far the ablest leader and exponent of Catholic idealism and of the Catholic movement generally in modern Italy. He first came into notice with 'Miranda,' a story in verse (1874), and added greatly to his reputation as a poet with 'Valsonda,' a volume of lyrics (1876). He was author of several novels which were received with marked favor, among them 'Master Chicco's Fiasco' (1885); 'Daniel Cortis' (1887); 'The Poet's Mystery' (1888); 'Piccolo mondo antico' (1895); 'Piccolo mondo moderno' (1901); 'Il Santo' (1905); 'Leila' (1910). His character delineation and portrayal have few equals in modern Italy. Consult 'Life' by Molmenti (Milan 1900); McKenzie in *Yale Review* (1912) and Thayer in *The Nation* (1911). See LITTLE OLD WORLD, THE.

FOGELBERG, Bengt Erland, bengt ĕr′-lănt fō′-gĕl-bĕrg, Swedish sculptor: b. Grotenburg, 8 Aug. 1786; d. Trieste, 22 Dec. 1854. He began his art studies in the Academy at Stockholm and in 1820 went to Rome, where he soon made a name. He was among the first to invest the mythologic figures of the North with the graces of the Grecian antique, and the influence of Thorwaldsen is plainly seen in his 'Odin and Thor' in the museum at Stockholm. He also vied with Thorwaldsen in such purely classic subjects as 'The Dying Argus'; 'Venus'; 'Cupid and Psyche.' He executed two statutes of Gustavus Adolphus, and, in collaboration with Byström, the series of colossal statues of the Swedish kings at Stockholm.

FOGGIA, fōd′jä, or **CAPITANATA,** căp-ē-tän-ä′tä, Italy, province on the Adriatic, between the provinces of Campobasso and Bari. It possesses rich pastures. Among its special products are wines, oil, grain, cattle, capers, saffron and fruits. The principal town is Foggia. Area, 2,688 square miles. Pop. 484,557.

FOGGIA, Italy, city, capital of the province of the same name, in the centre of the great Apulian plain, 46 miles east by south of Campo Basso. It is well built, most of the houses being reconstructed since an earthquake which happened in 1732. It has large storehouses for keeping corn, and is the place where the flocks that feed on the great plain of Apulia are registered. Piazza Federigo Secondo, with its Emperor's Fountain, commemorates the frequent sojourns here of Frederick II, who held a parliament here in 1240. The city contains a fine customhouse, theatre, gymnasium, technical institute, a school of industry, city park, botanical gardens and a public library. Pop. 79,213.

FOGHORNS. See FOG SIGNALS.

FOGLAR, fō'glär, **Ludwig,** Austrian poet: b. Vienna, 24 Dec. 1819; d. Kammer, 15 Aug. 1889. Among his poems mostly lyric are 'Cypresses' (1842); 'Sunbeams and Shadows' (1846); 'Clara von Vissegrad,' an epic (1847); 'Freedom's Breviary' (1848); 'Joyful and Sorrowful' (1867); 'Saint Velocipede' (1869), a satire (under the pseudonym "LEBRECHT FLOTT").

FOGO, FUEGO, fwä'go, or **SAINT PHILIP.** (1) One of the Cape Verde islands, in the Atlantic Ocean, having its highest point 9,760 feet above sea-level, and presenting the appearance of one single mountain, though, on the sides, there are deep valleys; area 170 square miles. Pop. estimated at 16,000. It has no rivers and a scarcity of fresh water prevails, yet it is one of the most fertile islands of the archipelago, producing excellent maize and fruits. The chief town is Nossa Senhora da Luz. (2) Fogo, a port of entry and capital of Fogo Island, Newfoundland, at the southwest entrance to Notre Dame Bay, 122 miles northwest of Saint John's, N. B. See CAPE VERDE ISLANDS.

FOHI, fō'hē. the first Chinese emperor and legislator. He is said to have founded this kingdom 2,207 B.C. Nothing certain is known of his reign; but there are attributed to him the institution of marriage, the invention of fishing, hunting, music and writing. He acknowledged and worshipped a supreme deity. He is supposed to be the Noah of the Bible.

FÖHR, fėr, Germany, an island of Schleswig, in the North Sea; area 31 square miles. The town of Wyk is a fishing centre, and was a bathing resort. The population numbers 4,200, mostly Frisians.

FOIL. A leaf or extremely thin sheet of metal used for a variety of purposes, as for protecting articles from moisture. Foil is often applied in sheets of tin amalgam behind mirrors to make them reflect perfect images. Foil is made of a variety of metal alloys in numerous beautiful colors, which under the name of Dutch foils are much used for backing gems and imitations of precious stones, thus adding to their lustre. Various ornamental foils of metal are used in stamping the titles on the cloth covers of books, and for other ornamentation. A mottled or variegated foil is made by superimposing a group of foils of different colors and beating them out until they become one sheet. The separation of the colored sheets is assisted by a system of punching. The sheet lead which is used for the lining of tea chests is a familiar application of foil. The thinnest sheets of metal are termed leaf, while slightly thicker is foil. (See GOLD-BEATING). When still thicker it is sheet metal.

FOIL, Fencing. See FENCING.

FOIX, fwä', an old and distinguished French family which flourished from the 11th to the 15th century taking the title of Count from the district of Foix. Consult Flourac, L., 'Jean Ier, comte de Foix, vicomte souverain de Béarn' (Paris 1884); Castillon, 'Histoire de comte de Foix' (Toulouse 1852) and Froissart, 'Chroniques' (ed. by Luce and Raynaud Paris 1869–97).

FOIX, Gaston, COUNT DE, and VISCOUNT DE BÉARN, French military officer: b. 1331; d. 1391. He acquired the surname of Phœbus. He spent his life in war and the chase. His first service in arms was against the English in 1345. During the revolt known as la Jacquerie he contributed to the rescue of the Dauphin at Meaux. He wrote a book on the pleasures of the chase, of which several editions were published.

FOIX, Gaston de, French soldier: b. 1489; d. Ravenna, Italy, 11 April 1512. He had the command of the army of Italy, and on account of the daring exploits was denominated the "Thunderbolt of Italy." After performing prodigies of valor he was killed at the battle of Ravenna.

FOIX, France, capital of the Department of Ariège, on the River Ariège, 50 miles south of Toulouse, on the Southern Railway. It contains an ancient chateau and a Gothic church, which was built in the 14th century, a lyceum, library, training school, court of assizes and a tribunal of the first instance. Flour-milling and iron-working are the chief industries. In the Middle Ages Foix was the capital of the counts of Foix. Pop. 4,498.

FOKIEN. See FU-KIEN.

FOKSHANI, fōk-shä'nē, town in Rumania. Extensive vineyards are in the neighborhood and the best brands of Moldavian wines are produced here. The town is well-known historically. It was destroyed by the Russians in 1789 and by the Turks in 1822, and was captured by the forces of the Central Powers in their campaign of 1916. Pop. 24,183.

FOLCMOT, fōlk'mōt. See FOLKMOOT.

FOLDING MACHINES. The folding of printed sheets for books or newspapers was performed by hand up to 1856, when Cyrus Chambers, Jr., of Philadelphia, invented a practical folding machine, which was manufactured by him and his brother Edwin, who within a few years produced a considerable line of folders of various sizes and capacities. The folding machine of C. S. Forsaith, of Manchester, N. H., designed for folding newspapers only, came out some years later. A good many Stonemetz folders were sold between 1880 and 1890. The leading folders on the American market are the Dexter, Chambers, Brown, Cleveland and Eclipse. The vital principle, on which nearly all paper folders are based, is the descent of a dull blade on the paper sheet at the point where the fold is to be made, the blade thrusting the paper between rotating rollers which draw it in folded. The making of a second fold is accomplished in the same way, the paper being passed along by traveling tapes from one stage to another, up to three or four folds. The earlier machines were not positive in their register, that is, the fold was apt to vary slightly in position, but the modern machines are very accurate, and large 64-page sheets are commonly folded on the machines with entire satisfaction. The heavy coated paper introduced about 1890 to 1895 developed a tendency to buckle or crease slightly on the last fold of a large sheet, and the most recent folding machines have introduced devices to overcome this difficulty. The most conspicuous improvement of recent years has been the drop-roll, which has added materially to the speed of the machines. This was introduced by Dexter, and enabled the sheet to be fed sideways — that is, the shortest way. Registering by means of points, that slip into holes or slits in the sheet, is another feature of modern machines. The equipping of machines with pasters was accomplished early in the history of the folding machine, and this feature has been brought to a high degree of perfection. The paste is held in fountains and laid on the paper in strips as it passes by.

Folders are now made in so many styles that the mere enumeration of them requires considerable space. They may be either drop-roll or point-feed; there are quadruple 16s and double 32 folders some of which insert one sheet within another; there are marginal folders for books and pamphlets and for jobbing work; also large single and combination periodical folders, rapid circular folders, plain circular folders, jobbing circular folders and various so-called newspaper folders. Then there are special newspaper and periodical folders, combinded folding and wire-stitching machines, combined folding and feeding machines and combined feeding, folding and wire-stitching machines.

The Dexter combined folding and wire-stitching machine was introduced in 1897, and it is continuous and strictly automatic. It takes the sheets from the platforms of the feeders, and folds, gathers, collates, covers and wire-stitches, delivering completed copies without intermediate handling.

There are various other combinations and arrangements for special work, which, together with those above named, have greatly reduced the cost of binding books, pamphlets and periodicals.

On fast web newspaper printing presses there is used a rotary type of folder that was brought out by the Hoes, and controlled by them for many years, being probably their most valuable patent in connection with these presses. Three folding blades were mounted on a single cylinder, catching the paper three times in a single revolution, thus securing immense speed. The device is not accurate enough for book folders, but it made possible the enormous speeds obtained by the so-called lightning newspaper presses.

The job folding machines for doing odd work of varying sizes have come into extensive use within a few years. They are small and comparatively simple machines capable of operating at high speed. See Newspapers, American.

FOLDS, a term applied to bends or flexures in the rocks of the earth's crust. They vary from a few inches across to structures many miles in extent. Up-arches from which rocks dip outward in both directions are known as anticlines. Down folds, or troughs, toward the centre of which beds dip from both directions are known as synclines. A flexure in the rocks with dip in only one direction is a monocline. Anticlines and synclines may be broad gentle folds of simple character, or they may be composite, with many minor crumplings on the limbs of the major fold. Such composite folds are known as anticlinoria and synclinoria. Very broad, gentle, simple folds are sometimes spoken of as geanticlines and goesynclines. Nearly circular anticlines, from which the beds dip outward equally in all directions from the central point, are known as domes or quaquaversal folds. Nearly circular synclines are called centroclinal folds. Sometimes folds are so closely compressed that the two sides become nearly parallel, in which case they are called isoclines. Of course there may be isoclinal synclines and isoclinal anticlines. If folding has gone so far that one side of the fold has passed the vertical and the beds are upside down, the fold is said to be overturned. If overturned so far that the reversed beds are nearly horizontal the fold is recumbent. Overturned and even recumbent folds are common in closely folded mountain regions, such as the southern Appalachians. The trough or crest of the fold is called the axis. It is rarely horizontal over any considerable distance. The angle of inclination of the axis is called the pitch of the fold.

After folds have been made (see Mountains), erosion starts cutting them down, and if given a sufficiently long time will plane the topographic irregularities away completely. They are still folds, however. In such a case any given bed will outcrop in two narrow bands, one on each flank of the fold. If the fold is without pitch the bands will be parallel, but if the fold pitches the beds will meet at one end or the other in the shape of a long narrow «V.» Closely folded regions are also often cut by large faults (q.v.) and are frequently areas of intense metamorphism. (q.v.). For a discussion of the origin of folds, see Mountains.

FÖLDVAR, fėld′vär (ancient Sussuinum), a walled town of Hungary, on the slope and summit of a hill, on the right bank of the Danube, 49 miles south of Budapest. The population, 12,087 in 1910, is mostly Magyar.

FOLENGO, Teofilo, tā-ō′fē-lō fō-len′gō (pseudonym «Merlino Coccajo»), Italian poet: b. near Mantua, Italy, 8 Nov. 1491; d. near Bassano, Italy, 9 Dec. 1554. He was the first to win fame as a writer of macaronic verses. His ‘Macaronic Work of Merlino Coccajo, Mantuan Poet’ (1517–25) comprises the comico-heroic poems, ‘Baldus’ and ‘Moscæa’ (War of the Midges). His satire is mostly against monachism. He writes in cynic humor, but under his burlesque lies a vein of serious purpose. Under the pseudonym «Limerno Pitocco» he wrote in

Italian the epic satire of 'Orlandino' (1526), in ridicule of the story of 'Roland'; then, partly in macaronic, partly in pure Italian, partly in pure Latin, 'The Chaos of Three by One' (1527), in which he darkly recounts the events of his own life.

FOLEY, John Henry, Irish sculptor: b. Dublin, 24 May 1818; d. Hampstead, England, 27 Aug. 1874. His 'Ino and Bacchus' (1840) attracted much notice, and was followed by a succession of admirable classical and ideal works, including 'A Youth at a Stream'; 'Caractacus'; and several excellent subjects from Shakespeare. The most noteworthy feature of his work, however, was his careful and artistic execution of his statues and busts, which included the Hampden and Selden figures in Saint Stephen's Hall, Westminster; Goldsmith, Burke and O'Connell, in Dublin; and the equestrian statues of Lord Hardinge and Sir James Outram, for India, which rank among the finest equestrian sculptures of modern times. The statue of the Prince Consort for the Albert Memorial is also Foley's work, and the bronze statue of Stonewall Jackson for the State of South Carolina.

FOLGER, fōl'jėr, **Charles James,** American jurist: b. Nantucket, Mass., 16 April 1818; d. Geneva, N. Y., 4 Sept. 1884. He was graduated at Hobart College in 1836 and admitted to the bar in Albany, N. Y., in 1839. He became judge of the Court of Common Pleas of Ontario County in 1843; was a member of the State senate in 1861–69; elected associate judge of the State Court of Appeals in 1871; succeeded to the chief justiceship of that court in 1880; and was Secretary of the United States Treasury in 1881–84. In November 1882 he was the Republican candidate for governor of New York, but was defeated.

FOLGER, Henry Clay, Jr., American capitalist: b. New York, 18 June 1857. He was graduated at Amherst College in 1879 and in law at Columbia in 1881. From 1879 to 1911 he was with the Standard Oil Company of New Jersey and in the latter year was made president of the Standard Oil Company of New York. He is president also of several other concerns, mostly ancillary companies of the Standard Oil Company. He has written many monographs on Shakespeare and has what is regarded as the finest library of Shakespeareana in America, comprising about 20,000 volumes. Amherst conferred on him the degree of Litt.D. in 1914.

FOLGER, Peter, American colonist and author: b. England 1617; d. Nantucket 1690. He emigrated from Norwich, Norfolk, to America and settled at Martha's Vineyard in 1635. He was grandfather of Benjamin Franklin, his daughter Abia having married Josiah Franklin and borne the illustrious statesman and philosopher among her 17 children. He was clerk of the courts in 1673 and possessed a literary sprightliness which descended to his grandson, as may be seen from a perusal of his 'A Looking-glass of the Times, or the Former Spirit of New England Revived in this Generation' (1675).

FOLGER, William Mayhew, American naval officer: b. Massillon, Ohio, 19 May 1844. In 1864 he was graduated at the United States Naval Academy, was promoted through the several grades, attaining the rank of captain in 1898 and rear-admiral in 1904. In 1890–93 he was chief of the Bureau of Ordnance with rank of commodore, in 1894–95 commanded the *Yorktown*, in 1896–98 was lighthouse inspector, in 1898 commanded the *Kearsarge*, was again lighthouse inspector in 1901–04. He commanded the Philippine squadron of the Asiatic fleet in 1898 and the cruiser squadron until March 1905, and was commander of the Asiatic fleet at his retirement 30 June 1905.

FOLGORE, fŏl'gō-rā, Italian poet. He flourished at the end of the 13th century, but the dates of his birth and death and the incidents of his life are unknown. He wrote a number of sonnets, all of which have been translated into English by Dante Rossetti and J. A. Symonds. Their poetic merit is far from contemptible and they are particularly interesting from the vivid light which they throw on Italian society. Their prevailing tone is one of refined epicureanism and their style is mainly remarkable for affluence of imagery. "Every line," says Mr. Symonds, "presents a picture and each picture has the charm of a miniature fancifully drawn and brightly colored on a missal marge." Consult Rossetti, 'Dante and His Circle' (1874); and Navone, 'Le Rime di Folgore' (1880).

FOLIATION, a term restricted by Darwin, and subsequently by geologists, to the arrangement of the constituent portions of a rock in alternating and more or less parallel layers or folia of different mineralogical nature. It differs from cleavage (q.v.), which is applied to certain superinduced divisional planes that render a rock fissile in that it may or may not be accompanied by a tendency for the rock to split parallel to the foliation; and from lamination, in which the planes of separation in a rock are the result of deposition in successive layers. If foliation postdate the formation of the rock, the structure is practically the same as that known as schistose. The folia are conspicuously lenticular, thickening and thinning out and reappearing after an interval on the same or a different plane. These alternately lenticular folia are usually more or less closely welded or felted into each other, so that they are not readily separable; and they frequently present the appearance of being puckered or crumpled. The crystalline texture and the foliated character of the schists distinguish them at once from any ordinary bedded "fragmental rock." See SCHIST; CLEAVAGE; and METAMORPHISM.

FOLIES-BERGÈRE, fō'lē'bĕr'zhār', a vaudeville hall of Paris, in the Rue Richer, founded in 1869. It acquired a world reputation for the genre of amusement presented on its stage.

FOLIGNO, fō-lē'nyō, Italy, a town and episcopal see in the province of Perugia, on the Topino, 25 miles southeast of Perugia. It is 770 feet above sea-level and is a most picturesque and interesting town. Its churches contain paintings by several of the Umbrian masters; the cathedral façade was restored in 1903. The town has two palaces of the Renaissance period, a gymnasium, technical school and seminary. Leather, paper and soap are the principal manufactures and the bulk of the town's trade is in silk and oil. Foligno was founded in the 8th century and changed hands frequently until it was destroyed by the Perugians in 1281. The Trinci family ruled it from 1305 to 1439, when it became part of the states of the Church. In 1860 it was ceded to Italy. It suffered from a severe earthquake in 1832. Pop. (town) 9,532; (commune) 28,373.

FOLIO, (1) *in printing:* *a.* The running numbers placed at the top or bottom of the page of a book. The even folios are on the left-hand pages, the odd upon the right. The folios or prefatory matter are frequently in lower-case Roman numerals. *b.* A sheet of paper once folded. *c.* A book of the largest size, whose sheets are folded but once, four pages to the sheet; hence it is used generally for any large volume of work. (2) *In bookkeeping,* a page or opening in an account book. (3) *In law,* a certain number of words in legal documents. The number varies in the States; thus in some of them, as in England, in law documents, conveyances, deeds, etc., the folio is 72 words; in chancery and parliamentary proceedings 90 words. In New York and other States 100 words constitute a folio.

FOLIUM OF DESCARTES, dā-kart, in mathematics, a curve such that the simultaneous increments of two lines drawn from the generating point of the curve to two fixed points have always to each other a constant ratio. If the ratio is equal to — 1, the oval becomes an ellipse; if it is equal to + 1, it is an hyperbole.

FOLK, Joseph Wingate, American lawyer and public official: b. Brownsville, Tenn., 28 Oct. 1869. He was graduated with degree of LL.B. at Vanderbilt University 1890, LL.D., University of Missouri, 1905, William Jewell College, 1906, Drury College, 1907, Westminster College, Fulton, Mo., 1907, Southwestern Baptist University, Tennessee, 1908; was admitted to bar 1890; practised, Brownsville, four years; moved to Saint Louis, Mo., 1894; circuit attorney, city of Saint Louis, 1900–04; exposed vast amount of political and official corruption and prosecuted numerous bribery cases which attracted wide attention. He was governor of Missouri 1905–09, carrying the State on Democratic ticket by a majority of 30,000, the only successful candidate on the State ticket; author of Missouri Anti-Lobby Law; State-Wide Primary Law; Initiative and Referendum Law; 2-Cent Fare Railroad Law; Child Labor Law; Compulsory Education Law; public utility commission for cities; Anti-Race Track Gambling Law; law removing derelict officials for failing to enforce the statutes. He was delegate-at-large from Missouri to Democratic National Convention, Denver, 1908, and made lecture tour of the United States 1909–10; was appointed solicitor for Department of State, by President Wilson, 22 Sept. 1913 and chief counsel for Interstate Commerce Commission 1 March 1914.

FOLK-LORE, the science which embraces all that relates to ancient observances and customs, to the notions, beliefs, traditions, superstitions and prejudices of the common people. Gomme's divisions are (1) Traditional narratives: (a) folk-tales, (b) hero tales, (c) ballads and songs, (d) place legends; (2) traditional customs: (a) local customs, (b) festival customs, (c) ceremonial customs, (d) games; (3) superstitions and beliefs: (a) witchcraft, (b) astrology, (c) superstitious practices and fancies; (4) folk-speech: (a) popular sayings, (b) popular nomenclature, (c) proverbs, (d) jingle rhymes, riddles, etc.

Folk-lore has been observed and noted by countless writers of early days, but it was not till after the beginning of the 19th century that its value for the elucidation of the social history of mankind had become apparent to thinkers and its systematic study been seriously begun. Meantime the reawakening to natural poetry and to the beauty of free emotional expression in literature, which lay at the foundation of what it is usual to call Romanticism, had already commenced even in the 18th century. The publication of Percy's 'Reliques of Ancient English Poetry' (1765) had given a powerful impulse to Scott and others in England, to Herder and to Arnim and Brentano in Germany, who found a rich wealth of traditional poetry, the poetic value of which they fortunately had the eyes to see. But the study of folk-songs really began with Scott's 'Minstrelsy of the Scottish Border' (1802–03). It was perhaps an advantage rather than a disadvantage that the first worker in this new field was but the folk-lorist unawares and mere great poet and romancer of genius that he was; for our folk-poetry would never have enriched and permanently influenced all later English literature but for its own intrinsic and genuine poetic quality, any more than our detached folk-lore facts would ever have risen above the dignity of the whimsical pastime of an idle hour but for their inherent though unsuspected faculty for throwing light backward on the history of human civilization. All, or nearly all, the facts of comparative mythology are to be found in folk-belief in solution; a great many facts of folk-belief are to be found in comparative mythology crystallized. The facts are essentially the same in both cases, but the study deals with them at different stages.

First in importance of the collections of material is still the earliest, the 'Children and House Tales' (1812–14) of the brothers Grimm (q.v). Grimm's 'German Mythology' (1835) is still unequaled in the range of its erudition and in the systematic thoroughness with which the mythology and superstitions of the ancient Teutons are traced back to the dawn of direct evidence and downward in decay and diminution to the popular tales, traditions and phrases in which they still unconsciously survive. These two works of Grimm created a school, whose abundant labors later folk-lorists have entered into, while they have enlarged the horizon of the science, because the stamp of soundness and sufficiency so far as it goes is impressed in all the work of Grimm and his successors, of whom, in Germany, the most eminent were Kuhn, Mannhardt, J. W. Wolf and W. Schwartz. To the English-speaking world Max Müller's essays revealed a new world of undreamt-of affinities and the combined charm of their literary grace, wide learning and rare powers of exposition converted every reader to a theory which, as has been seen, is only now being displaced by another with a sounder basis of real philosophy and facts. Since then the study of folk-lore has become fashionable, indeed almost an article of patriotism, and societies have been formed in most countries to further its study. Of these the most important is still the Folk-lore Society of England, established in 1878, with its official organ, the *Folk-lore Journal*. The American Folk-lore Society was instituted at Cambridge, Mass., early in 1888: (1) For the collection of the fast-vanishing remains of folk-lore in America, namely: (a) Relics of old English folk-lore (ballads, tales, superstitions, dialect, etc.); (b) lore of negroes in the Southern States of the Union; (c) lore of the Indian tribes of North America (myths, tales, etc.); (d) lore of French Canada, Mexico, etc. (2) For the study of the general subject and the publication of results of special studies in this department. The journal of the American society has amply justified its existence by series of articles of striking originality and value.

Folk-lore, though it takes cognizance of many apparently trivial matters, is of great importance in the science of comparative mythology and helps to throw much light on the relationships between races and on the origin and development of religious beliefs and ceremonies. It is therefore of great assistance to the ethnologist, the sociologist and the historian, as well as to the student of comparative mythology and of the science of religion. It has attracted much attention in recent times. See ASTROLOGY; FABLE; FAIRY TALES; LEGEND; MYTHOLOGY; SUPERSTITION; WITCHCRAFT.

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FOLK-MOOT (Anglo-Saxon *folcgemote* or *folcmot*), the old English parliament of the shire or of the township; the meeting of the people to discuss and decide on public affairs. Its guiding principle was the common law of England, called the *folc-riht*, public right, of pre-Norman times. There was never in England a true folk-moot of the whole nation until the establishment of the House of Commons about the middle of the 13th century. According to Tacitus, the Germans of his time consulted the whole nation on all important matters, and the Campus Martius or Madius of the Franks was in later times the folk-moot of that nation. Such moots continued to a much later age among the Scandinavian peoples, as, for instance, the Icelandic *Althing* and the Swedish *Ting* at Upsala. The Witenagemot (q.v.) in England, though indirectly a national senate, was in reality an assembly of magnates. The shire-moot or county court was composed of the representatives of every township within its jurisdiction, and thus was a complete folk-moot for the district comprised in the shire. By concentrating those representatives of the shires in a single assembly the modern House of Commons was formed. Consult Kemble, 'The Saxons in England'; Stubbs, 'Constitutional History.'

FOLK-MUSIC. The music of a nation is generally based on folk-music, or the folk tunes that are handed down from generation to generation along with its folk-lore. It is thus to be distinguished from *art* music, the studied compositions of the professional musician. Folk-songs generally exhibit strong racial characteristics, those of northern peoples mainly in melancholy minor strains, those of the southern, on the other hand, being vivacious and lively. The wandering refrains of the countrysides in Scotland formed the basis of the songs of Robert Burns. The words of many national folk-songs have survived; but the music, which was never submitted to writing, has been lost. Some of these melodies, however, have survived in a remarkable manner: by the Church musicians of the 12th century adopting the tunes and making additions of their own; and the music of many great masses, notamly Palestrina's, is based on the folk-song. Haydn was familiar with the peasant music of Croatia, and he embodied their spirit by writing many of his own compositions in the same vigorous and direct style. Germany of all countries is the richest in folk-music; the folk-songs have been the themes of many compositions of Mendelssohn, Mozart and Weber; but as Germany is one of the countries which has set the standard in art music, few of the tunes have remained unaltered. Liszt and Schubert utilized the music of the Magyars and the Gypsies; Dvórák the folk tunes of Bohemia; Chopin those of Poland; and Brahms and others the characteristically national, melancholy music of Russia. Wales, Ireland and Scotland are rich in folk-music; Beethoven went to Scotland and Ireland for some of his melodies; the Norwegian composer Grieg drew part of his inspiration from Scotland; and Puccini traveled as far as Japan for one of his operas. From the fact that dance music preponderates in the music of nations whose musical culture has remained in a primitive stage, it is concluded by some authorities that vocal music in its origin may have been a mere accompaniment of the dance.

Folk-music has within recent times engaged in an increasing degree the serious attention of students of the art of music; and societies have been formed to collect and arrange them in musical notation. (See FOLK-LORE; MUSIC). Consult Engel, 'The Literature of National Music' (London 1879); 'Introduction to the Study of National Music' (ib. 1886); Finck, 'Songs and Song-Writers' (New York 1900); Parry, 'Evolution of the Art of Music' (New York 1896).

FOLK PLAYS. See RURAL THEATRES.

FOLK-PSYCHOLOGY, an ethnological study of the psychology of races and people, differing from folk-lore, which studies survivals. Among modern students of this science are Baldwin, Wundt, Lombroso, Lazarus, Steinthal and Felix Adler. Folk-psychology considers the habitat and food conditions of a people, its somatology, sex, technology, æsthetics, jurisprudence and pathology. It deals with the psychology of groups rather than individuals. Nearly all the books written upon this subject have been published only in German. The whole science is regarded by some American psychologists as misleading and tending to a mechanical interpretation of the universe and these theories of might makes right, which have characterized German thought. See ETHNOLOGY.

FOLK-RIGHT, the native laws and customs in Early English history as distinguished from the rules and observances introduced by William the Conqueror and his followers. See ENGLAND.

FOLK-TALES AND MYTHS OF THE AMERICAN INDIANS. Creation Myths.— When primitive man began to reason about himself and the world around him, among the first questions he was bound to ask himself were how he came to be upon the earth and what was the origin of the earth itself and the creatures on it and the inhabitants of the heavens above. All these questions he settled to his own satisfaction, however childish his reasoning may seem to us with our more perfect knowledge of the laws of nature. Very various are the answers given to these questions. The Bella Coola tell us that their great goddess, Afraid of Nothing, who dwells in the Far East, created the world. Then the mountains were monster human beings and tyrants. She defeated them, made them smaller and confined them each to a certain place so that they might no longer do harm. In general, however, the Indian mind accepts the eternal existence of the world or of primary matter; and he troubles himself only with accounting for its specific forms. The Zuñi Awonawilona, the Maker and Container of All, created the primal fogs and mists and took upon himself the form of the Sun with all his personal attributes. Then, by his own brightness and light, he thickened the cloud-mists into water, thus creating the World-holding Sea. With his own flesh he fecundated the sea and made two worlds. Out of this came Mother Earth, she of the four divisions or wombs from which sprang all beings. In the lower cave or womb of the earth remained many half-formed beings crawling over one another. Then up sprang Poshaiyandkya, the All-wise-one, from the sea, after passing through a long and terribly dark passage and made his way to the Father-sun and begged him to deliver the men and creatures in the earth-cave. Thus was the Earth Mother delivered. The Thompson River Indians combine the functions of the Creator and the culture god in The Old One who created the earth and the people and taught them how to spear fish, to make bows and arrows and spears, to shoot the deer, to dress skins, cook and preserve meats and, in fact, all they know and do. Another version of the myth, which is probably the earlier, says that Old One taught them whence they came, which would seem to imply that he had no hand in their creation. According to a west-coast myth the Raven-man was the creator of the sun, the moon and the stars. The Maidu have a complete chain of creation myths which divide themselves naturally into periods, much as the Aztec and the Maya myths do. In the first of these Coyote is the discoverer and Codoyanape is the earth-namer of this world. Together they prepare it for the first people. Then follow the creation of the First People, the making and planting of the germs of human beings. The third witnesses the transformation of the human race into animals, after a long period of strife. Another cycle describes the dark tricks of Coyote and the attempts of the Earth-namer to overcome him. Finally the latter is defeated in the contest and takes his departure to the bright Eastern-land, after the appearance upon earth of the present human race. The Achomawi, a neighboring tribe, have the same myth, but say that, in the beginning there was nothing but the vast shoreless sea and the cloudless sky above it. At first a tiny cloud appeared in the sky and, condensing, became the Creator, Silver-gray Fox. A fog arose, condensed and became Coyote. Thus we have the birth of the two creators. The Wyandot people once lived in the Land-beyond-the-sky until one day the shaman told them to dig round the roots of a wild apple tree which stood in the great lodge of the chief. They broke through the floor of the sky-land and the chief's daughter fell through the hole thus made. Below on the great World of Waters a white swan swimming heard a heavy peal of thunder, the first on earth, and saw the apple tree and the woman falling from the sky-land. On the soft down of the swan's back she fell and rested there. Big Turtle called a council of all the animals and they decided to try to get earth from the apple tree's roots at the bottom of the sea. Otter, Muskrat and Beaver all were successively drowned in attempting to dive for it. Finally Frog too came up dead but with a few grains of earth between her toes. From these grains an island was made around the body of Big Turtle, which finally grew into the great earth world. When there are earthquakes it is because Great Turtle gets tired, or is moving his feet. The second part of this myth, with some slight variations, is told by the Crees. Wisagatka, sailing on a raft on the primæval ocean, tied a string to a muskrat and sent him down to bring up some mud from the bottom of the waters; but he was drowned. The Crow was sent on the same errand; but he came back without performing his mission. Then Wisagatka took some small pieces of moss from the raft and «made medicine» over them. Then he gave the moss to Wolf and told him to run round the raft. Wolf continued running for a week and the raft got larger and larger, till it grew into a great land. Wolf never came back. The reason there are so many springs on earth is because the water comes up between the logs of Wisagatka's old raft. According to the Thompson River Indinas Old One lives in the Sky-land, which is reached only from the tops of the high, snow-capped mountains. Once there was no earth but only a great waste of waters. Old One took some earth from the Sky-land, made a large, hollow ball and threw it down on the waters, where it flattened out into a very large island. This is why the earth is full of flats, hollows and mountains, with islets, rivers and lakes. Then Old One came down and made grass and trees to grow. This is why all around the earth is water. The Haidas say that at first there was no land, but only a great sea. Then the Raven appeared upon a speck of earth. This increased rapidly; and Raven divided it into two parts, one large and one small. Practically all the Indian tribes of America have their creation myths; so that there are literally hundreds of them; but the above will give a general idea of what they are all like.

Migration Myths.— Quite frequently migration myths are mistaken for creation myths and classified as such. So often is this done, in fact, that it may be taken as the general rule. Yet they should be carefully distinguished from one another. The true creation myths make an attempt to explain how and why the earth, man, animals and all other existing things came into being. Migration myths state the appearance of certain races in certain places with some incident connected with their first appearance there. Midway between these two extremes is the discovery myth which is made to take the place of a real creation myth. Here some great tribal or racial hero, after a series of adventures, discovers the earth, the heavens, the region of the dead or of the Supernatural People. He seems to embody the spirit of the wandering tribes; and such myths should not be classed as creation stories. These migration myths are quite common throughout the American continents and often they take the place of true creation myths. This is probably why they have been confounded with them by most writers on mythology. The Peruvians and the Chibchas of Colombia say that their first ancestors made their appearance from the bottom of a sacred lake. The Muskhogees assert that on the top of a great mount stood the house of Esaugetuh Emisse, the Master of Life (Breath). Standing on this hill he directed the waters back into their proper channel. This seems to be a migration myth which has got mixed up with the Biblical narrative of the creation. The first ancestor of the Minnetarees emerged from a lake with an ear of corn in his hand. This idea of coming out of the waters or from the region under the earth probably had its origin in the fact that all vegetation comes up out of the earth and all life depends upon it; while all fish come out of the water. A Mandan myth is typical of this class of stories, which have become real epics in the hands of the Mayas, the Chinooks and several other American races. The first Mandans lived in an underground village near a great lake. Some of them climbed the roots of a monster grape vine which penetrated there from the earth overhead and thus reached the regions above, which they found to be a land flowing with milk and honey. When the adventurers returned and related the story of their adventures all the other Mandans wanted to go to the land of light. So they began to climb the grape vine root. When a part of them had got out of the underground world, the weight of a very fat woman broke the root; so part of the people were left behind, where they still reside. In the hands of the Aztecs and other Nahuatl tribes this story becomes frankly a migration myth attached to that period in their very early traditional history when the Nahuas all came out of the seven caves, each cave representing the original habitat of one of the tribes.

The Coming of Light.— The myths of the creation of light are almost as plentiful as those of the creation of the earth. A legend common across the great woodless plains of the northwest of Canada says that the Sun-man and the Earth-woman were once husband and wife. The Sun deserted his wife and took all his relatives, the stars, with him. Old One passing by found the woman crying and learned from her what had happened. He went to the Sun's camp and drove the Sun, Moon and the stars up into the sky, saying: «Stay there where you shall not be able to desert people or hide yourselves but remain where every one may see you, either by day or by night.» Old One changed the Earth-woman into our earth. Her hair became the flowers and the grass, her bones the rocks; and he placed her where she can always see her husband. So she is glad. According to the Wyandot after the earth had been formed around Big Turtle's body, there was very little or, according to another version, no light. So the animals met in council to decide what to do about it. They agreed that a light hung in the sky would be a good thing. Little Turtle, by her powerful medicine, raised a great storm and tumbled from the sky a cloud. Into this climbed Little Turtle and up she went in it to the sky-land. There she gathered the lightning into a great ball, hung it in the sky and called it the Sun. She gathered another smaller ball of lightning and hung it in the sky also; and she called it the Moon. A west-coast myth says that in the days of the animal people there was darkness everywhere except in the lodge of Old Chief, the guardian of the light, who owned all the light, fire and water and would give none away. So the people were very miserable; and they begged the Old Chief for light. They tried witchcraft on him but he was too powerful for them. Then all the animals put on their dancing masks and aprons and went to the Old Chief's lodge; and there each one sang his own song. Fox sang for daylight; but Old Chief refused to give them daylight. Then they all sang together so powerfully, «Light, light, light!» that, in spite of Old Chief, the light began to steal up in the sky like a faint flush. Old Chief shouted: «Let there not be»; and at once the light disappeared down the sky, below the edge. Young Fox conjured, danced and sang and all the people danced and sang with him most powerfully and shouted: «Light, light, light!» and again the light began to steal up the sky like a faint flush, but stronger than before. When Old One beheld their powerful magic, he became very much excited and cried: «Let there not be Light!» He had not meant to say «Light» for it was taboo; but he had said it; and the power went out of his magic; and light flooded up into the sky. Another west-coast myth relates that, once upon a time the sun had only a goat-skin coat; but one day he met a boy whose witch mother had made him a magic many-colored coat of handsome feathers. It was brighter than the imagination. He saw this coat shining from afar off and he came down to see what it was that was making such glorious, many-colored light. He was so taken with it that he exchanged his own coat for it. The exchange was a good one, for, with the magic coat of the sun, the boy learned how to catch fish with hook and line and the sun obtained a splendor so great that even today, after many many years, we cannot look directly at his magic coat. There are numerous myths to explain why the moon is smaller and paler than the sun. Some of the Iroquois tribes account for the lesser brilliancy of the moon by saying that she became the wife of the sun; but she ran and hid in a cave, because she could not bear the heat of her husband. This made the sun very angry and he stormed terribly at his wife who remained trembling for fear in the cave; and it was only after a long time that she was persuaded to come out. When she did she had already become thin and pined away until she was nearly dead. She has never recovered her original brightness since that day. When she fattens up a little she immediately thinks of her husband's great anger; and she grows thin and pines away again. An Eskimo legend also accounts for the paleness of the moon thus: The house of the moon is covered with white deer skins which he keeps hanging out there to dry. So the moon's light is always dim. An Alaska myth asserts that the house of the moon is made of very clear, transparent ice and within it there is wondrously bright light, which shines through the walls. When this is more than usually brilliant its reflection causes the Northern Lights. Afraid of Nothing, the west-coast female divinity already mentioned, is represented as a wonderful woman-warrior who resides in the house of the sun. She is much feared, for her visits, like those of the Aztec moon goddess, cause sickness and death. She is said to have given the light to the moon; and she is herself undoubtedly the moon. It was dark in the Lillooet country because the sea gull had all the light hidden away in a box and would let out only enough for her own use, which was not very much. Now Raven was a great necromancer and he planned to get light for his people, so he went to the house of the Sea Gull, upset the box and let the light out so that it spread all over the world. A Pacific Coast version of the same myth says that Raven stole the baby of the Fire People and ran away with it to his country up among the great mountains. The Fire People sent messengers to him in an effort to get the baby back again. Finally he exchanged it for fire. Another version says he exchanged it for light to lighten the world. The Fire People agreed to teach him all the uses of fire including cooking.

The Rape of the Fire.— To account for how man first learned the use of fire the American Indians invented and told scores of myths all the way from Greenland to Tierra del Fuego. These myths show more invention than those of the creation. Most of them make the fire hero obtain his gift for man by robbery, stealth or deception, as in the preceding myth. The fire was usually guarded by some terrible, supernatural being. Frequently the guardian of the fire lived on the top of a great mountain or deep down in the earth. Sometimes the fire was gotten from the lightning, or from the Thunder Bird or from the clouds. The reason for these sources is evident. From the heart of the earth the volcano throws forth its fire; and out of the clouds comes the lightning. According to various American myths the fire was most jealously guarded because there existed a strong belief that some day it would burn up the world, as it had already done in the Aztec, Maya, Central American and at least one United States myth. Hence the desperate efforts made by the culture gods to obtain it and the difficulties placed by the story teller in the way of their achievement of their object. It was dark throughout all the land, so a west coast myth runs, and it was cold; so all the people suffered. The Raven resolved to find both light and fire. After many adventures he arrived at the home of the Great Thunder-Bird, and from him he obtained a little fire. Some of this he hid in the trees, where any one still can find it, and with the rest he made a tiny sun, which he threw up into the sky. There it grew large and lighted the whole earth. Many people had tried to steal the fire from the Fire Spirit, so the Algonquins say; but no one had succeeded. Nanabozho's grandmother was old, and she felt the cold very much as did all the old people. So Nanabozho went away eastward in his bark canoe, determined to find some fire and bring it back to his people. When he had crossed the Great Sea-water, he hid his canoe and changed himself into a white hare, and in this shape he came to the wigwam where the Fire Spirit guarded the sacred fire; and where he lived with his two great, strong, fierce daughters. Nanabozho wet himself in the lake near by, and apparently miserable and suffering from the cold, he crawled into the sacred wigwam, where one of the women took pity on him and set him by the fire to warm himself and to dry his fur. There they left him while they went to attend to their duties about the place in a distant part of the big lodge. Nanabozho the Hare moved closer to the fire; but his tread caused the earth to tremble so that the women ran up to see what had happened; and the Fire Spirit, who had been dozing by the door, woke up in a terrible fright. But the hare looked so miserable and bedraggled they did not suspect him. Finding everything apparently all right, the old man went to sleep again and the women went about their work. When all was quiet once more, Nanabozho transformed himself into a swift young Indian runner, seized a fire-brand and ran out of the wigwam in the direction of the Great Sea-water where he had hidden his canoe. The Fire Spirit and his daughters ran after him and, by their superior magic, gained rapidly on him. Nanabozho set fire to the prairie grass and raised a great thick smoke which blinded his pursuers and hid him from sight, and allowed him to reach his canoe in safety. But the fire people went round the smoke and, reaching the lake, followed Nanabozho across it. Nanabozho called to his canoe that went-by-itself to go faster and faster. Faster and faster it went and so it reached the shore ahead of the fire people. There Nanabozho hid the fire in a hollow log. The fire people looked everywhere for it but could not find it. When they had gone away Nanabozho took the fire out of its hiding place and warmed his grandmother and all the old people. But ever since that day there has been fire in wood and more in dry logs. According to the western Algonquins, Sistinakoo, the Fire King, who was a very great magician, held the fire imprisoned in the heart of the earth, in the very centre of four corrals, one within the other. In each of these corrals there was only one door. At the first door a monstrous venomous snake stood guard; at the second a great savage panther;

at the third the King of the Grizzly Bears and at the fourth mighty Sistinakoo himself. At a council of all the animals, the Fox was sent out to try to break through the barricades, but he failed. Then the chief of the Coyotes was sent. By his cunning he succeeded in passing all the guards one by one as they slept; and fastening a fire brand to his tail, he got through with all the inhabitants of the infernal regions on his track. He reached home in safety. This legend is common to various other United States tribes. It naturally varies in the recounting of the obstacles Coyote met with and the means by which he overcame them. The Carrier Indians had light, but they had no fire, and so they were terribly cold. Up on the top of a very high mountain old Old Chief had all the fire guarded and as he would not give the people any they resolved to get it by stealth. So they called upon Caribou and Muskrat, two great magicians, to help them. They all put on their dancing aprons and masks and entered the Fire Chief's lodge and began to dance and sing. All uninvited they did this. Muskrat sang magic words of his tribe, and all the people sang these words of Muskrat. Young Caribou jerked his head from side to side, very fast he jerked it, as he danced, and his magic mask of fine shavings, which he had made before he started out, caught fire. Old Old Chief sprang up and put the fire out. But Muskrat danced, Young Caribou danced, the people all danced; very swift they danced and the fire came again stronger than before, and again old Old Chief put it out. Once more the people and Caribou danced swifter and swifter. But Muskrat didn't dance. Behind the dancers he burrowed and burrowed with swift magic through the earth. Suddenly some one cried: "Look, look!" and pointed to a great mountain from which rose dense clouds of smoke. There stood Muskrat scattering the fire upon the land below. According to another story Bear had a wonderful medicine tree which he valued very highly for in it he had hidden the fire. Chipmunk discovered this secret and one day he shook the tree so violently that it set itself on fire and thus fire came into the world.

Day and Night.— Further west the Thompson River Indians have this same myth; but with them it refers not to the bringing of fire, but to the division of day and night. When Chipmunk set fire to Bear's medicine tree Bear put the flames out, for they were at the foot of the tree, by throwing earth on the fire. For some time a battle raged, Chipmunk alternately lighting and Bear putting out the flames. At last they both grew tired and agreed to have it alternately dark and light. This is how daylight and darkness came about. The Shuswaps have a very similar myth. They assert, however, that at first there was plenty of light, light all the time. But Grizzly Bear did not like this, so by very great medicine, singing and dancing, he tried to make it dark. When Coyote found what he was up to he at once called up all his big medicine, singing and dancing and crying in a very loud voice: "Light, light, light!" Bear danced and cried: "Dark, dark, dark!" Sometimes it was dark when Bear shouted the loudest; sometimes it was light when Coyote shouted the loudest. But with so much dancing, singing and shouting they both grew very tired after a while and agreed to have it dark half the time and light half the time. This is why darkness always follows the sun's path. According to the Blackfeet, Napi, their traditional hero, had a wife who was in love with a rattle snake. He set fire to the wood where the rattle snake lived, and when his wife came at him in a rage, he severed her head from her body. The head rolled along the ground after the children who had run away and the body still lived and was as terrible as before. So Napi ran for his life with his wife after him. To-day Napi the sun is still followed by his wicked, headless wife, the moon.

The Seasons.— Very few Indian tribes have no myth to account for the seasons. Fisher, the Ojibway hero, went to the Swallow-land, the Sky-land, far to the south where the swallows live. There the Swallow-man had them all tied together so that they could not wander. After numerous adventures, Fisher liberated the birds and allowed them to escape through a hole in the sky. But the Summer-man closed the hole before they all got through. This is why it isn't summer all the time. The Algonquins, the Iroquois and other tribes picture Spring as a Young Man and Winter as an Old Man continually at strife with one another. Sometimes one conquers, then the other. Thus it is warm and cold alternately. Another and much more detailed myth tells of Glooskap's journey to the land of the guardian of Winter, where he was entertained by the old man with stories. And as he told his stories Glooskap fell asleep and slept for six long months. Then he awoke and wandered further southward. As he went the air began to be warmer, the grass and flowers appeared and the leaves came again upon the trees. He came to a great forest where the little Summer-Woman lived. He caught her and abducted her and ran away with her followed by all the people of Summer-land. Outdistancing them he came again to the home of the guardian of Winter. There the old man again tried to throw his magic spell over Glooskap. But the latter, with the little Summer-Woman in his bosom gave the guardian of Winter back story for story. He described all the beauty of the southland and the little Summer-Woman listening was pleased and put forth all her magic and the snow and ice house of the Winter melted away and he fled to the north as the leaves came again upon the trees and the birds sang in them and all nature awoke once more to hail the coming Spring. Then came the Summer-people; and Glooskap left the land with them. Since then the Summer-people go to the northland every year from the Summer-land far to the south. The Blackfeet say that the Lord of Cold Weather is a tall white-haired old man clothed all in white who lives in a wonderfully sunlit white tepee far in the Northland, where he sits and smokes in silence all the dreary winter months through. Across his yellow face run two lines, one completely round the mouth and another across the forehead, just above the eyes, from ear to ear. He it is who sends the fierce Winter of the northwest of Canada and the great plains of northern United States. Estoneapesta, he of the Yellow-painted Snow-tepee, is his name and he is the lord of all the snows and biting winds of the Northland.

The Culture Gods or heroes appear in various forms in American myth from the cold northern regions to the far southern lands; but they have ever the same characteristics. They are always the personification of the winds or of one of them and they are the messengers of some higher power which has sent them upon earth to instruct man. Through them mankind has learned all that he knows. The culture gods go about the earth teaching and generally doing good. About them, however, there have collected, in the course of time, many stories that show plainly they are the invention of the various storytellers through which the original myth has passed in the course of its long history. The American culture myths have not been studied comparatively as they deserve, but such studies as have been made would seem to indicate that they are all, or nearly all, closely related. Almost everywhere, in addition to being the patrons of learning, of the arts and of all knowledge, they are also the special divinities of games of chance and, curiously enough, the patrons of thieves. The shadowy figure of the culture god stalks through the history of all the more cultured races of the American continents. He was the great patron divinity of the Toltecs, the most cultured of all the American races and the superstition of his second coming paralyzed the hand of the warlike Moctezuma and made it possible for a handful of Spaniards to conquer the greatest empire of the Western World. Hiawatha, Nanabozho, Wakiash, Quetzalcoatl, Yucano, Awonawilona, Glooskap, Poia, Kukulkan, Gucumatz and a score of other heroic figures stand prominent out from the lives of the various Indian races as the great instructors of their people. Of these the greatest in the United States is Nanabozho, whom Longfellow has immortalized as Hiawatha. See also AMERICAN MYTHOLOGY.

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FOLKESTONE, or **FOLKSTONE,** fōk'-stŏn, England, fortified seaport town in Kent County 62 miles southeast of London and seven west of Dover. The town is situated on a level plain near a range of low hills. Until the advent of the railway it was of little importance. Since then a steamer service has been inaugurated with Boulogne and extensive improvements have been made in the harbor and docks. The fishing industry is thriving. There is a large trade with France amounting to about $100,000,000 annually. The town is very old, containing remains of the successive conquerors, Roman, Saxon and Norman. Its modern facilities include promenades, pleasure gardens, an amusement pavilion and a fine bathing beach. It has electric light and an electric street railway system. It was the birthplace of William Harvey (b. 1578), the discoverer of the circulation of the blood and to whom a fine monument was erected in 1881. Pop. 33,502.

FOLKLAND, or **FOLCLAND,** fok'land, the land of the people, that portion of Anglo-Saxon England which was retained on behalf of the community. It might be occupied in common or possessed in severalty, but could not become allodial estate or absolute private property except with the consent of the Witan or highest council in the land. From time to time large grants were made both to individuals and to communities; and land thus cut off from folkland was called bocland or «book-land.» Ultimately the king practically acquired the disposal of it and the remnant of folkland became Crown lands.

FOLKMAR, Daniel, American anthropologist: b. Roxbury, Wis., 28 Oct. 1861. He was graduated at the Western College of Iowa in 1884 and continued his studies at Paris, Brussels and Berlin. He subsequently taught in several Western institutes of learning (1895–1900) and was professor of anthropology in the Université Nouvelle of Brussels 1898–1901. From 1903 to 1906 he was anthropologist and lieutenant-governor in the Philippine Civil Service; and special agent of the United States Immigration Commission 1908–09; special agent of the Census Bureau 1910–14; and since 1914 on the editorial staff of the United States Department of Commerce. Among his many writings are ‘L'Anthropologie Scientifique (1899); and ‘Leçons d'Anthropologie Philosophique’ (1900); ‘Album of Philippine Types’ (1904); ‘Dictionary of Races’ (1911); ‘Mother Tongue of Foreign Stocks’ (1910); also numerous articles and reports.

FOLKMOOT, fok'moot', formerly **FOLCMOTE,** in Anglo-Saxon England, an assembly of the people to consult respecting public affairs.

FOLKRIGHT, the body of customs which came to have the force of law in Anglo-Saxon England. In Norman times the term designated the native laws and customs apart from the laws imposed by the conqueror, and later it became synonymous with «common law,» which superseded it. See COMMON LAW.

FOLKS, fōks, **Homer,** American sociologist: b. Hanover, Mich., 18 Feb. 1867. He was graduated from Albion College (Michigan), in 1889, from Harvard in 1890, was superintendent of the Pennsylvania Children's Aid Society 1890–93, and in 1893 became secretary of the New York State Charities Aid Association. In 1900 he assisted the United States military government of Cuba in reorganizing the public charities of the island. In 1902–03 he was commissioner of charities for New York City. He was president of the New York State Probation Commission after 1907, and in 1911 president of the National Conference of Charities and Correction, in which he had been prominent for many years. His literary work includes the editing of the *Charities Review*, numerous reports and magazine articles, and the volumes 'History of the Care of Destitute, Neglected and Delinquent Children in the United States during the 19th Century'; and 'Problems in the Administration of Municipal Charities' (1904).

FOLLEN, August, later **ADOLF LUDWIG,** German poet: b. Giessen, Germany, 21 Jan. 1794; d. Bern, Switzerland, 26 Dec. 1855. He became extremely popular as the author of 'Sons of Fatherland,' a patriotic hymn; 'Malegys and Vivian' (1829), a romance of chivalry; and numerous translations and poetic appeals to the instinct for liberty. He was a brother of Charles T. C. Follen (q.v.).

FOLLEN, Charles Theodore Christian, American professor and Unitarian clergyman: b. Romrod, Hesse-Darmstadt, 4 Sept. 1795; d. 13 Jan. 1840, in the burning of the steamer *Lexington*, on Long Island Sound. He was educated at Giessen, and became professor of Latin and history at Coire, Switzerland. His liberalism in politics and theology caused him to be driven from that town, and he was afterward forced to leave Basel, where he lectured on law and metaphysics, for the same reason. He finally took refuge in the United States and for five years (1830–35) was successful as professor of German at Harvard. He then took charge of the First Unitarian Church of New York, a position which he retained for a year (1836–37). He removed to East Lexington, Mass., in 1839.

FOLLEVILLE, fŏl'vēl, **Gabriel Guyot de,** French ecclesiastic and adventurer: b. Brittany, 1760; d. Angers, 1794. He at first studied law, but at the outbreak of the Revolution abandoned this profession to enter the Church. In 1790 he was assistant at Dol and the following year was obliged to flee to Paris, when he retracted the oath to the *Constitution civile du clergé*. In the autumn of that year he abandoned Paris and went to Poitiers, where he entered on his remarkable career of impostor. Forging credentials of a papal delegate and dressing in bishop's costume he announced himself at the Convent of the Filles de la Sagesse as bishop of Agra, and in a short time wielded great influence in Poitiers. He was made chief of the ecclesiastical council of Saint-Laurent-Sur-Sèvre and of the administrative and judicial councils of a neighboring district. A priest of Saint-Laud on making inquiries in Rome about Folleville learned that there was no bishop of Agra. Soon after the defeat at Le Mans, Folleville was captured, tried and sent to the guillotine at Angers. Consult Bossard, 'L'Invention de l'évèque d'Agra' (1893) and Chassin, 'La préparation de la guerre de Vendée' (1892).

FOLLY ISLAND, a small island off the coast of South Carolina, in Charleston harbor. It is separated from the mainland by Folly Island channel. It was the scene of several engagements during the Civil War.

FOLSOM, Charles, American scholar: b. Exeter, N. H., 1794; d. 1872. He was graduated from Harvard in 1813, was in the navy as chaplain and midshipmen's instructor in mathematics. In the latter capacity he had David G. Farragut as one of his pupils. He was tutor at Harvard 1821–23, and librarian in 1823–26. In 1824 he was associated with William Cullen Bryant in the editorship of the *United States Literary Gazette*. As a member of the printing firm of Folsom, Wells & Thurston he long prepared for the press the classical works used at Harvard. In 1883 with Andrews Norton he was an editor of the *Select Journal of Foreign Periodical Literature*. He published an edition of Cicero's selected orations (1811), and an edition of selections from Livy (1829).

FOLSOM, Charles Follen, American physician: b. Haverhill, Mass., 3 April 1842; d. 1907. He was graduated from Harvard in 1862, was in the Southern States in connection with the Freedmen's Bureau from 1862 to 1865, and after study in the Harvard Medical School practised medicine in Boston from 1870. In 1873–75 he studied at the universities of Vienna, Berlin and Munich. In 1877–82 he was lecturer on hygiene at Harvard, and in 1879–88 lecturer in and assistant professor of mental diseases. In 1882 he became a member of the National Board of Health, Lunacy and Charity. His writings include 'Mental Diseases' and 'The Present Aspect of the Sewage Question as Applied to Boston' (1877).

FOLSOM, George, American antiquary: b. Kennebunk, Me., 23 May 1802; d. Rome, Italy, 27 March 1869. He was graduated at Harvard in 1822, studied law and removing to New York in 1837 became librarian of the New York Historical Society. He was a member of the New York State senate 1844–48, and was appointed chargé-d'affaires at the court of the Netherlands 1850–54, and was for some years president of the American Ethnological Society. Among his publications are 'History of Saco and Biddeford, Maine' (1830); edition of the 'Collections of the New York Historical Society' (1841), translation of 'Despatches of Hernando Cortes' (1843); 'Political Condition of Mexico' (1843); 'Documents Relating to the Early History of Maine' (1858).

FOLSOM, Joseph L., American soldier: b. Meredith, N. H., 19 May 1817; d. San José, Cal., 19 July 1855. He was educated at West Point, and served four years in Florida against the Indians (1840–44), and in California in the Mexican War. He communicated officially to the government the discovery of gold in that State; and Folsom City on the American River, near the earliest found gold deposits, is named after him, as one who became identified with the development of the State and especially of San Francisco, where he was a large property owner.

FOLSOM, Nathaniel, American soldier and statesman: b. Exeter, N. H., 1726; d. there, 26 May 1790. During the French and Indian War he was at the head of the company of New Hampshire militia and at Fort Edward was under the command of Sir William Johnson. In 1755 he took part in capturing Baron Dieskau. When the War of the Revolution began Folsom was made brigadier-general of New Hampshire volunteers; was present at the siege of Boston and becoming major-general served until the end of the war. He was New Hampshire delegate to the Continental Congress in 1774, 1777 and 1778–80. He presided at the Constitutional Convention of New Hampshire in 1783.

FOLSOM CITY, Cal., city of Sacramento County, 21 miles northeast of Sacramento, on the Southern Pacific Railroad, and on the American River. Fruit and stock-raising, dairying and crushed rock are the principal industries of the town, which in the halcyon days of gold-mining in California was a place of considerable importance. A State prison is situated in the neighborhood. Pop. 1,500.

FOLTZ, fōlts, **Philipp von,** German painter: b. Bingen, 11 May 1805; d. Munich, 5 Aug. 1877. At Munich he was a pupil of Cornelius, whom he assisted in the decoration of the Glyptothek and the arcades in the Hofgarten. He was later a professor in the Academy, and in 1865–70 director of the Central Gallery. His historical paintings are minute and faithful in detail and skilfully designed in their pictorial arrangement, but they have been criticized as exhibiting stilted drawing and dryness of color. The Cologne Museum possesses his ‘Minstrel's Curse’ (after Uhland's ballad); the Maximilianeum, Munich, his ‘Humiliation of the Emperor Frederick I before Duke Henry the Lion,’ and ‘Pericles attacked by Cleon and his Followers.’

FOLWELL, William Watts, American educator: b. Romulus, Seneca County, N. Y., 14 Feb. 1833; was student in Ovid Academy and was graduated from Hobart College (B.A. 1857; M.A. 1860; LL.D. 1878). Teacher of languages in Ovid Academy, 1857–58; adjunct professor of mathematics in Hobart College, 1859–60. Student in the University of Berlin, 1860–61; first lieutenant, captain, brevet major, major and brevet lieutenant-colonel, 50th New York Engineers, 1862–65; in business in Ohio, 1865–69; professor of mathematics in Kenyon College, 1869; president of the University of Minnesota, 1869–84; professor of political science, 1885–1907; professor emeritus since; member of the Minnesota Centennial Commission, 1876; president of the Minneapolis Society of Fine Arts, 1882–92; member of the Minneapolis board of park commissioners, 1889–1907; president of same, 1894–1900; acting president American Economic Association, 1892; chairman State Board of Charities and Corrections, 1895–1901; Phi Beta Kappa; member of the Hennepin County Bar, Minnesota Historical Society, corresponding member Wisconsin Historical Society. Author of ‘Minnesota, The North Star State’; university addresses and numerous published papers and addresses.

FOMENTATION, a method of relieving pain through applying warm water or moisture to the afflicted part. The usual method is to apply a cloth just wrung out of boiling water, but turpentine, belladonna and other substances are sometimes added.

FONBLANQUE, fôṅ'blânc', **Albany William,** English journalist: b. London, 1793; d. 1872. At the age of 14 he was sent to Woolwich to prepare for the Royal Engineers, his health failing, his studies were suspended for two years, and he then studied law. In 1812, however, he began writing for the newspapers and soon attracted attention by the boldness of his opinions and the superiority of his style. From 1820 to 1830 he was successively employed upon the staff of *The Times* and the *Morning Chronicle*, whilst he contributed to the *Examiner* and the *Westminster Review*. In 1828 the *Examiner* was given over to his complete control and until 1847 he directed the fortunes of that journal with great brilliancy and success. Fonblanque was offered the governorship of Nova Scotia, but although it offered him a chance to advocate a more liberal political system in colonial government he decided to remain with the *Examiner*. In 1847 he was appointed statistical secretary of the Board of Trade. During his later years he took no prominent part in public affairs. His political views may be best judged from his ‘England under Seven Administrations’ (1837). As a journalist he must be ranked as a reformer. Journalism before his day was regarded with disfavor, and men of high attainments hesitated to enter the field. Fonblanque showed, however, that the profession was one in which a man of sterling character and high literary ability might honorably put forth his best gifts. Consult ‘Life and Labors of Albany Fonblanque,’ edited by his nephew, Edward Barrington de Fonblanque (London 1874), a collection of his articles preceded by a brief biographical notice.

FONCIN, fôṅ'săṅ', **Pierre François Charles,** French educator: b. Limoges, 1841. He was educated at the Ecole Normale, Paris, and became professor of geography at Bordeaux in 1876. Three years later he became director of the Academy of Douai and in 1881 was made director of secondary education in the Ministry of Public Instruction. In 1882 he was appointed inspector-general of secondary education. He was one of the founders of the Alliance Française, of which he served terms as president and general secretary. He published ‘Textes et récits d'histoire de France’ (1872); ‘La prémière année de géographie’ (1874); ‘Géographie générale’ (1887); ‘Le pays de France’ (latest ed., 1903); ‘La France’ (Eng. trans. by H. H. Kane, 1903).

FOND DU LAC, fŏn'dŏ-lăk, Wis., city and county-seat of Fond du Lac County, on Winnebago Lake, at the mouth of Fond du Lac River, and on the Chicago, Milwaukee and Saint Paul, the Chicago and North Western and other railroads, about 60 miles northwest of Milwaukee. Fond du Lac was first settled in 1836 by Germans; became a village 1 March 1847, and a city in April 1852. Fond du Lac has important manufactures and is noted for its dairy and agricultural products. The chief industries, besides agriculture, are lumber, grain, flour, leather, paper, machinery, refrigerators, sash and doors, shoes, wagons, furniture, shirts, etc. The United States census of manufactures for 1914 showed within the city limits 100 industrial establishments of factory grade, employing 2,292 persons; 1,925 being wage earners receiving annually a total of $1,000,000 in wages. The capital invested aggregated $6,353,000, and the year's output was valued at $6,761,000; of this, $1,142,000 was the value added by manufacture. The city has four banks, with a combined capital of $500,000, and an annual business of $15,000,000. The principal buildings are the Carnegie Public Library, Elks' Club House, Saint Mary's Springs Sanitarium, Saint

Agnes' Hospital, Henry Boyle Roman Catholic Home for the Aged, Grafton Hall School for Girls, State women's reformatory. The city has also an excellent public school system (10 buildings), a parochial school and a cathedral school. The city adopted the commission form of government in 1914. Pop. 20,367.

FONDA, N. Y., town and county-seat in Montgomery County, on the New York Central and the Fonda, Johnstown and Gloversville railroads, on the Mohawk River, 27 miles northwest of Schenectady. Fonda contains a public bathhouse with mineral water, an industrial school for girls, and large ginseng gardens; is the centre of a large agricultural region. The principal industries are knitting and flouring mills, a broom factory, silk mills, machine shop, bottling works, paper container factory, etc. The village owns the water system. Pop. 1,100.

FONDI, fōn'dē, the ancient Fundi, a town of Italy, Naples, in the province Terra di Lavoro, near a lake to which it gives name. It is a bishop's see, and contains a cathedral. The Lake of Fondi (ancient *Lacus Fundanus* or *Amyclanus*) lies between the road and the sea; it sends forth noxious exhalations. Pop. 9,930.

FONNI, fŏn'nē, Sardinia, town in the province of Sassari, 3,280 feet above sea-level, 20 miles south of Nouro. Just north of the town is the site of the Roman station of Sorabile. Excavations made in 1879–80 led to the discovery of the remains of this station, arranged round three sides of a courtyard some 100 feet square, including traces of baths and other buildings. Nearby are several menhirs, called *pietre celtiche* (Celtic stones) in the district. Pop. 4,323.

FONSAGRADA, fŏṅ'sạ-grạ'dạ, Spain, town of the province of Lugo, 25 miles northeast of Lugo, and 3,166 feet above sea-level. It is a market for the agricultural products of the region and has manufactures of linen and frieze. Pop. 19,219.

FONSECA, fōṅ-sä'kä, **Antonio Manuel da,** Portuguese artist: b. Lisbon, 1796; d. 1893. He studied in the Academy at Lisbon, became a professor there, was in 1839 appointed court painter and in 1862 was elected corresponding member of the Academy of Fine Arts at Paris. Several of his pictures, which are chiefly of a historical character, were exhibited in the Paris Exposition of 1855.

FONSECA, Juan Rodriguez, Spanish ecclesiastic and statesman: b. Toro, near Seville, 1451; d. Burgos, 4 Nov. 1524. He passed through many grades of preferment from the archidiaconate of Seville, to the archbishopric of Burgos, where he became *limosiuero* or private chaplain to the king and queen. In 1493 Ferdinand and Isabella appointed him to superintend the preparations for the second voyage of Columbus and practically to administer the affairs of the New World. He became first president of the Council of the Indies (q.v.), organized in 1511. His conduct in the discharge of this office has been stigmatized by modern historians, and he has been charged with shortsightedness, if not with malignity, in his treatment of Columbus, Cortes and Las Casas.

FONSECA, Manoel Deodoro da, Brazilian soldier and politician: b. province of Alagoas, 5 Aug. 1827; d. Rio de Janeiro, 23 Aug. 1892. He was educated as a soldier and graduated with the rank of sub-lieutenant of artillery in 1849. He saw active service in the Paraguayan war (1868–70), and attained the rank of major-general. In 1887, although a conservative and personally attached to the Emperor Dom Pedro II, he and others felt bound to protest against the acts of the government. They were punished for insubordination, revolted and proclaimed a republic, which was recognized by the United States and later by the powers of Europe. Dom Pedro was banished and Fonseca was elected President of the government 24 Feb. 1891. In November of the same year he was accused of arbitrary acts and compelled to resign. He was succeeded by the Vice-President, Peisoto.

FONSECA, a bay or gulf on the Pacific Coast of Central America, one of the largest in the South Pacific and affording one of the finest harbors in the world. It is bounded by Nicaragua, Honduras and San Salvador (q.v.).

FONSECA BENEVIDES, Francisco da, Portuguese author: b. Lisbon, 1835. At first he studied medicine, but at 16 joined the navy and in 1854 became professor of physics in an industrial school of Lisbon. In the following year he became a member of the faculty at the Naval Academy. In 1866 he was elected to the Lisbon Academy and represented his government at several international expositions. He became inspector of industrial schools in 1884. He is the founder of the Industrial Museum at Lisbon. His writings include 'Curso de artilheria' (1850); 'Curso de phvsica' (1863); 'Relatorio sobre a exposição de Paris em 1867' (1867); 'Principios de optica' (1868); 'O Fogo' (1869); 'Noções de physica moderna' (2d ed., 1880); 'Elementos de balistica' (2d ed., 1882); 'Mémoire sur la vitesse de propagation des flammes' (1880); 'As rainhas de Portugal' (2 vols., 1880). Consult da Silva, I. F., 'Diccionario bibliographico portuguez' (Vol. IX, Lisbon 1870).

FONSECA LIMA E SILVA, Manuel da, Brazilian soldier: b. Rio de Janeiro, 1793; d. 1862. He entered the Portuguese army in Brazil, and was appointed lieutenant-colonel in the struggle which subsequently took place for the independence of the country. Under the new régime the Emperor Pedro I chose him as lord chamberlain. When Pedro abdicated (1831) Fonseca sided with the Liberals and rose to high rank in the government, being Minister of War (1831), Minister of the Interior (1836), and in 1851 he was appointed general and commander-in-chief of the army.

FONT. (1) In church architecture, the vessel which contains the water for baptism. It is frequently sculptured in stone or marble, with richly decorative designs. The form of font with which we are now familiar seems to have been introduced in mediæval churches. In the early Latin Church, from the time of Constantine, baptism was administered in baptisteries, which were buildings separate from but adjoining the church. (See Baptistery). (2) An assortment of any particular kind or size of type used in printing, each font containing a proportionate number of letters, figures, spaces and punctuation marks. See TYPE.

FONTAINE, fôṅ-tān, **Pierre François Léonard,** French architect and author: b. Pontoise, France, 20 Sept. 1762; d. Paris, 10 Oct. 1853. He took the second grand prize of Rome 1785, going to Italy in 1786, and there connecting himself with Percier (q.v.), who, as director of the decorations of the Opera Paris, called him to his aid, a partnership then being formed which lasted till the fall of Napoleon, when Percier retired. They constructed a beautiful stairway in the Louvre; the Arc du Triomph du Carrousel; the arcades of the Rue de Rivoli as far as the Rue de l'Echelle. He retained the favor of the Bourbon kings, constructing the Galerie d'Orleans at the Palais-Royal, the Chapelle Expiatoire, the Chapelle Ferdinand, repairs of the Louvre and the Tuileries, and the hospital at Pontoise. He is regarded as one of the first ecclesiastical decorative artists of the 19th century.

FONTAINEBLEAU, fôṅ-tān-blō, France, town of northern France, in the department of Seine-et-Marne, and in the midst of the forest of same name, about two miles from the left bank of the Seine, and 37 miles east of Paris. It is well built, partly of stone and partly of brick, with spacious and regular streets; is the seat of a court of first resort and several public offices; contains fine barracks and a military college, a communal college, school of design and engineering, public library of 28,000 volumes, public baths and several hospitals; and has manufactures of calico, gloves, porcelain and stoneware; quarries of sandstone, extensively used in paving the streets of Paris and the roads of the surrounding districts; and a trade in wine, fruit, preserves, cattle, etc. Pop. of commune 14,679.

The castle or palace of Fontainebleau, from which the town derives its chief importance, lies to the southeast of the town, is one of the most magnificent in France and is indeed one of the world's most famous public monuments. Many of its sovereigns have made it their favorite residence and vied with each other in lavishing upon it all the embellishments that art could furnish, without any limitation as to expense. Henri IV, Louis XIV, Napoleon I, Louis Philippe, and Napoleon III all expended large sums upon it. It is now a summer residence of the President of the republic. Fontainebleau holds a great place in French history; it was here that the revocation of the Edict of Nantes was signed in 1685; it was here that Pope Pius VII was held a prisoner by Napoleon in 1812–14; and here also Napoleon signed his own acts of abdication in 1814 and 1815.

The Forest of Fontainebleau has for centuries been the haunt of and a source of inspiration to the artists of France. It covers an area of about 65 square miles and is renowned for its sylvan loveliness. The village of Barbizon on its northwest edge has been made celebrated by such artists as Willet and Corot. Fontainebleau has given its name to a school of painters.

FONTAINEBLEAU, School of, a group of artists assembled at Fontainebleau in France by Francis I, where they were employed in decorating the palace. There were two branches, Flemish and Italian; the influence of the latter, led by Rosso dei Rossi (1495–1541), eventually dominated French art (q.v.).

FONTANA, fōn-tä'nä, **Carlo,** Italian architect: b. Brusciato, Italy, 1634; d. Rome, 1714. He was a pupil of Bernini. While still very young he executed important commissions, including the Grimazzi and Bolognetti palaces, the monument of Queen Christina of Sweden in Saint Peter's, and the fountains of Saint Peter and Santa Maria in Trastavere. He also built the cathedral at Fulda. Among his published works are 'Il Tempio Vaticano e sua origine, con gli edifici piu cospicui antichi e moderni' (1694); 'Ultissimo Trattato delle acque correnti' (1697); 'L'Anfiteatro Flavio' (1725).

FONTANA, Domenico, Italian architect: b. Mili, Italy, 1543; d. Naples 1607. Cardinal Montalto (afterward Pope Sixtus V) engaged him to construct a chapel in the church of Sta. Maria-Maggiore, and a palace in the garden of the same church. But the pecuniary resources of the cardinal failed and the undertaking would have been interrupted had not Fontana himself supplied the means for continuing the work. Sixtus V wished to remove the great obelisk now in front of Saint Peter's Church, which was then nearly buried under the rubbish, to the middle of the square. Fontana happily executed this gigantic operation in 1586. Among other buildings erected by Fontana by the command of Sixtus V, the library of the Vatican and the aqueduct (*acqua felice*), deserve particular mention. Having been accused of converting to his private use the money received for public purposes, he was deprived of his office by the Pope, but immediately received the offer of the post of architect and chief engineer of the king of the Two Sicilies, and in 1592 went to Naples. He there constructed several canals to prevent inundations, a new road along the bay and the royal palace in the capital.

FONTANA, Felice, Italian physiologist: b. Pomarolo, in the Italian Tyrol, 1730; d. 1805. He was appointed professor of natural philosophy in the University of Pisa, and while retaining this position he formed the museum at Florence which contains an immense number of anatomical preparations in colored wax, which exhibit all parts of the human body in the minutest detail, and in all imaginable positions. They are executed with the greatest skill, and were made by different artists under the direction of Fontana. Fontana wrote several works on scientific subjects. some of which have been translated into German and French. He also made discoveries relative to the application of carbonic acid, and different sorts of gas. He was buried in the church of Santa Croce by the side of Galileo and Viviani.

FONTANA, Lavinia, Italian portrait-painter, daughter of Prospero Fontana: b. Bologna, 1552; d. Rome, 1614. She received her early instruction from her father, but gradually adopted the Caraccesque style with quasi-Venetian coloring. She was greatly employed by the ladies of Bologna, and, going to Rome, painted the portraits of many illustrious personages, being under the patronage of the Buoncampagni, of which Gregory XIII was the most powerful member. Her principal works are a Venus in the Museum of Berlin; 'Virgin lifting a Veil from the Infant Christ,' in the Escorial, Madrid; and 'The Queen of Sheba visiting Solomon.' Her own portrait was perhaps her masterpiece. It belongs to the counts Zappi of Imola, the family into which she married. She was elected member of the Academy of Rome.

FONTANE, Marius, French writer and administrator: b. Marseilles, 4 Sept. 1838. He met Ferdinand de Lesseps in the Orient and became his secretary, shortly afterward being appointed chief of exploitation and secretary of the Suez Canal Company and later administrator and member of the Committee of Direction of the Panama Canal Company. He was implicated with the other officers in the downfall of that company, was condemned in 1893 to two years' imprisonment, but this verdict was set aside on appeal, and after another trial he was acquitted. Among his works are 'Les Marchands de Femmes' (1863); 'Confidences de la vingtiéme année' (1863); 'Selim l'égorgeure' (1865); 'Zara la rebelle' (1866); 'La Guerre d'Amérique' (1866); 'Le Canal maritime de Suez' (1869); 'Essais de poésie vidique' (1876); 'L'Histoire universelle' (Vol. I, 1881, Vol. X, 1899).

FONTANE, Theodor, German novelist: b. Neuruppin, Prussia, 30 Dec. 1819; d. Berlin, 20 Sept. 1898. He was of French Huguenot descent, but few writers have limited themselves with such affectionate single-mindedness to subjects connected with German life. He prepared at first for the career of an apothecary, hoping to take over his father's shop, but came into contact with literary men in Berlin, who inspired him with a desire to take up a literary occupation. He visited England several times (1844, 1852–60) and became intimately acquainted with the social and political conditions of that country, concerning which he wrote reports for the Prussian government. On his final return to Germany he became an editor of the *Preussische Zeitung* (better known as the *Kreuz-Zeitung;* then as now the organ of the agrarian Junker class) until 1870, when he accompanied the troops invading France and was taken prisoner by the French. After his return to Germany, he was dramatic critic for the *Vossische Zeitung* until 1889. It is particularly interesting to note, in connection with the last period of Fontane's life, that it displays a greater and better literary activity than his earlier years, and that he retained a faculty for understanding younger men and rejoicing in new literary forms. Thus he hails with prophetic appreciation the rising naturalistic school in German novel and drama, and finds himself regarded, perhaps even against his will, as a sort of party leader of the younger literary generation, of which Gerhart Hauptmann is the leading spirit (1884–89). Fontane's 'Wanderungen durch die Mark Brandenburg' (1862–81) are a series of travel studies of the province of Brandenburg, Prussia, in which he displays a thorough sense of landscape, milieu and provincial types, but his more enduring contribution is in a few of the historical and contemporary novels of realistic tendency produced in his later years. 'Grete Minde' and 'Schach von Wuthenow' are psychological romances taken from the history of Brandenburg, while 'L'Adultera,' 'Irrungen Wirrungen,' 'Effi Briest,' 'Stine,' 'Cecile' represent his most successful stories of modern city and country life, usually of the upper classes, in Germany. His 'Works' (22 vols., Berlin 1905–11), include much autobiographical matter, as well as letters and literary studies. Erich Schmidt's 'Charakteristiken' has an authoritative article on Fontane.

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FONTANEL, the soft spots on the heads of newly-born infants. Usually four such spots are discernable on the skull, the anterior or great fontanel, the posterior, the sphenoidal and the mastoidal. Of these all but the first close within a few months after birth. The anterior or great fontanel closes about one year after birth, but in some cases persists during the second year of life. At one time the term was used to denote an artificial ulcer, caused by practitioners under the mistaken idea that the resultant pus drained away the disease from another part of the body.

FONTANES, Louis, Marquis de, French writer: b. Niort, Poitou, 6 March 1757; d. Paris, 17 March 1821. He went in 1777 to Paris, where he acquired a reputation by his poems 'Le Cri de mon Cœur' (1778); 'Le Verger' (1788); 'L'Essai sur l'Astronomie' (1789), and 'L'Epitre sur l'Edit en Faveur des Non-Catholiques' (1789). He also wrote a metrical translation of Pope's 'Essay on Man' (1783). In 1802 he was made a member and in 1804 president of the legislative body. His admiration of Napoleon was great; and his oratorical talents were often employed in eulogizing the emperor's acts. In 1810 he entered the Senate, and passing on the fall of Napoleon into the service of the Bourbons, was raised to the peerage by Louis XVIII. His writings, prose and poetic, which are regarded as models of elegance and correctness, were edited by Sainte-Beuve in two volumes in 1837, with a critical and biographical memoir.

FONTARABIA. See Fuenterrabia.

FONTENAY-LE-COMTE, fŏṅt'nā'lĕ-kōṅt', France, capital of an arrondissement in the department of Vendée, 30 miles northeast of La Rochelle, on the Vendée River. It contains two ancient churches and many old houses, a public fountain in Renaissance style, from which the town is named. Its industries include the manufacture of felt hats, oil, soap, flour, leather, lumber, etc. It has a good trade in horses, mules, grain, lumber, etc. The town has had a continuous existence from Gallic times. In 1360 it was ceded to the English but was retaken in 1372 by Du Guesclin. It suffered greatly in the religious struggles of the 16th century, was dismantled in 1621 and was occupied by the Republicans and Vendean insurgents in 1793. It was the capital of Vendée from 1790 to 1806. Pop. 10,379.

FONTENELLE, fôṅt-nel, **Bernard le Bovier de,** French poet and miscellaneous writer: b. Rouen, 11 Feb. 1657; d. Paris, 9 Jan. 1757. Although he lived to the age of nearly 100 years and retained till his death a remarkable degree of activity, he came into the world so weak that it was not thought possible that he could survive. In 1674 he went to Paris and soon became known by his poetical effusions and learned works. Before the age of 20 he had assisted in the composition of the operas of ‘Psyche’ and ‘Bellerophon,’ which appeared under the name of his uncle, Thomas Corneille (q.v.). In 1683 appeared his ‘Dialogues of the Dead,’ which were favorably received, although his continual straining after wit and novelty deprives them of the charm of natural ease. His ‘Entretiens sur la Pluralité des Mondes’ (1686) was the first book in which astronomical subjects were discussed with taste and wit. He was chosen a member of the French Academy in 1691.

FONTENOY, fôṅt-nwä, **Battle of,** one of the most famous battles in the war of the Austrian succession. It was fought at a small village of the same name, in western Belgium. Here 11 May 1745, the French under Marshal Saxe defeated the Allies under the Duke of Cumberland, with very heavy loss on both sides.

FONTEVRAULT, fŏṅ'tĕ-vrō («Fons Ebraldi»), France, town in the department of Maine-et-Loire, 10 miles southeast of Saumur. Its interest centres in its abbey, which for over a century has been abused as a place of detention for convicts. In a chapel are effigies of Henry II of England and of Eleanor of Guienne, of Richard I of England and of Isabella of Angoulême, wife of John of England. Details and diagrams of this famed abbey are found in Viollet-le-Duc, ‘Dictionnaire de l' architecture.’ Pop. 2,248. Consult Bossebœuf, ‘Fontevrault, son histoire, et ses monuments’ (Tours 1890) and Edouard, ‘Fontevrault et ses monuments’ (2 vols., Paris 1875).

FONTEVRAULT, Order of, a branch of the Benedictine order of monks; so named from the place in France where the first monastery of the sect was erected. The order was started in the 12th century by Robert d'Abrissel, who brought monks and nuns under one roof and placed them under the government of a female, because Jesus placed John in subjection to the Virgin Mary, saying: «Woman, behold thy son» (John xix, 26). The founder of the monastery was suspected of immorality, a charge which his followers strenuously denied. In 1106 the order received the sanction of Pope Pascal II; in 1113 it was exempted from episcopal jurisdiction. In 1177 some monks connected with it came over to England by invitation of Henry II. It was remodeled in 1507 by the Abbess Renée of Bourbon.

FONVIELLE, fōṅ'vyĕl', **Wilfrid de,** French aeronaut and author: b. Paris, 1824; d. 1914. In his early career he taught mathematics, but becoming interested in aeronautics about 1858, thereafter made several ascents with Tissandier. In 1870, during the siege of Paris, he escaped from the city in a balloon and went to London, where he lectured on republican institutions. He published ‘L'Homme fossil’ (1865); ‘Les merveilles du monde invisible’ (1866); ‘Eclairs et tonnerres’ (1867; English trans.); L'Astronomie moderne’ (1868); ‘Aventures aëriennes’ (1876); ‘La prévision du temps’ (1879); ‘Histoire de la lune’ (1886); ‘Mort de faim’ (1886). Consult ‘Travels in the Air’ (London 1871). Containing an interesting account of Fonvielle's exploits as an aeronaut.

FOOCHOW, foo-chow', or **FU-CHAU,** China, capital of the province of Fu-Kien, in a plain surrounded by an amphitheatre of hills, on the left bank of the Min, 125 miles northeast of Amoy. It consists of the town proper, surrounded by walls and of extensive suburbs, which, stretching along both sides of the river, communicate by a stone bridge. The walls, 30 feet high and 12 feet wide at top, are overgrown with grass, and the gates, seven in number, are overlooked by high towers. The streets are extremely dirty, and the lines of shops, crowded with goods or with workmen in the act of making them, make the whole place look like one vast series of market-stalls. The principal edifices are the Ching-hwang Miau and several other temples. Foochow is one of the five ports thrown open by the Treaty of 1843. The trade is extensive; there is a good drydock and adequate wharfage accommodation, but the navigation of the river from the sea to the harbor is difficult. Principal exports — timber, bamboo, fruits, tobacco, potash, paper and especially for the foreign trade — tea. A disastrous cyclone visited the port on 15 Sept. 1909, in which over 1,000 persons lost their lives. In 1912 the net value of the trade of the port was $13,800,000, the imports from foreign countries totaling $5,460,000. In the same year 679 vessels entered with a total tonnage of 520,534. Pop., including suburbs, about 624,000.

FOOD. Commonly speaking, foods are those substances eaten or drunk for the building up and maintenance of the human body, and to supply energy for its activities. In the more exact scientific sense, only those constituents of the foods consumed which are actually assimilated are considered foods: the non-assimilable constituents being regarded as waste. Some scientific writers classify air as a food, but generally the term is limited to the substances taken into the stomach in eating and drinking.

The processes of assimilation are discussed in the article NUTRITION, and the scientific selection of foods for specific purposes in the article DIETETICS.

There have been several different classifications of foods, from various bases. The most practical seems to be that which is used in the study of Nutrition and Dietetics. This grouping is first broadly into Inorganic and Organic foods, referring to their origin in nature.

The inorganic foods are: water, and the mineral salts. Water, indeed, may be regarded as the most important of all foods, as it constitutes nearly 70 per cent of the human body, and is an absolute necessity in the continuance of the processes which maintain the body. The average amount of water consumed per day is about four pounds, much more than the dry weight of all the other foods combined.

Of the mineral salts, common salt (sodium chloride) is the one taken in largest quantity, and the only one eaten in its natural state. Other mineral constituents of ordinary foods, which are essential in the body economy, are lime, phosphorus, iron, potash, magnesia and sulphur; and in much smaller quantities, iodine, fluorine and silica.

The organic foods are subdivided into three general sections: (1) carbonaceous foods, in which carbon is the principal element; (2) nitrogenous foods, in which nitrogen is the element of chief importance; and (3) carbo-nitrogenous foods, in which both carbon and nitrogen are contained in notable proportions.

Carbonaceous foods include starches, sugars, vegetables, fruits and fats. Nitrogenous foods include lean meats and eggs. Carbo-nitrogenous foods include the cereals, leguminous seeds (as peas, beans, lentils, etc.) milk and its derivatives and nuts.

The pure starch foods in common use are cornstarch, tapioca, sago and arrowroot.

The sweet sugars are derived from the juices of the sugar-cane and the sugar beet, and the sap of some varieties of the maple. The sweetless sugar known as corn syrup, or glucose, is obtained from the starch of corn by chemical process.

Vegetables fall naturally into two groups: the roots and tubers, in which the food material is stored in a more or less enduring form; and the so-called «green» vegetables, which are perishable, and must be consumed while fresh.

In the first group will be sweet potatoes, white potatoes, parsnips, onions, beets, turnips and carrots. The second group will contain cabbage, cauliflower, the several kinds of «sprouts,» green peas and green beans, spinach, asparagus, rhubarb, etc. With these are usually grouped squashes, tomatoes and cucumbers, which, strictly speaking, are fruits, though served as vegetables.

The typical fruits contain more or less sugar, and the valued fruit acids, and besides, a considerable proportion of starchy matters, as in the case of the banana. In the common dried fruits — dates, figs, raisins and prunes, the carbonaceous content is very high.

The fats, though classed with the carbonaceous foods, have so small a proportion of oxygen (as compared with the others) that they are sometimes put in a class by themselves, and called hydrocarbons. Besides the fats of the various meats, this group includes butter, cream, olive oil, cottonseed oil, cocoa and palm oils, and even cod liver oil, to be regarded as a food rather than a medicine.

The nitrogenous foods are chiefly the flesh of animals, birds, fish, shellfish, etc., and eggs. With these also belong the meat extracts and similar preparations.

The carbo-nitrogenous group includes the grains — wheat, oats, rice, etc.— and the flours, meals and special preparations made from them, including breads and crackers. Green corn belongs in this group, and also dried peas, beans and lentils and peanuts. All sorts of nuts are also included, though the nitrogen content of the chestnut and coconut is so low as almost to place them with the carbonaceous foods. Milk is put into this class because of its casein. This substance in the form of cheese is one of the most valued of the carbo-nitrogenous class, as, besides the nitrogen, it contains a large proportion of fat.

Among the liquid foods, or beverages, preparations of tea and coffee are to be classed as stimulants rather than foods. Their food value is nearly all owing to the sugar and milk added to them. Chocolate and cocoa, however, possess large food values with a notable nitrogen content. Other articles of food are the condiments, spices and sweet herbs, which, while they have some small food value, are useful chiefly in rendering other foods more palatable. For an intimate study of the food question see the articles DIETETICS, and NUTRITION OF MAN.

Bibliography.— Bailey, ‹Source, Chemistry and Use of Food Products› (1914); Carpenter, ‹Foods and their Uses› (1908); Carrington, ‹The Natural Food of Man› (1912); Christian, ‹Uncooked Foods and How To Use Them› (1904); Forward, ‹The Food of the Future› (1904); Greer, ‹Food: What It Is and What It Does› (1915); Sherman, ‹Food Products› (1914); Snyder, ‹Human Foods› (1910); Vulte and Vanderbilt, ‹Food Industries› (1914).

FOOD, Adulteration of. The first protective food law on record was English and bears date of 1203. It was designed to restrain dishonest British bakers from preying upon the public. A few years later butchers, brewers and wine makers were added to those needing legal restraint against fraudulent adulterations. At that time the utmost publicity was given to the offense, the culprit being hauled in a filthy wagon throughout the city or town to receive the execrations of the populace. And, in some cases, at the end of his ride he was placed in the pillory, where, doubtless, the rabble saw to it that a due portion of contempt should be meted out to him. Subsequently, hardened offenders were punished by the destruction of their shops, and banishment from the scenes of their nefarious labors. Nevertheless, the practice of adulterating food continued, and even increased, until nearly every line of standard food was the subject of a special law — a condition indicating that food adulteration was rife.

In Germany, as early as 1390 wine sellers were banished for selling «false wine,» and some of them were branded, as evidence to every one that they were frauds.

In the early part of the 18th century the British government combated continuously the adulteration of teas, at first with large fines, and later with imprisonment. Coffee and beer also received special attention in the prohibitory laws. About 1850 the London *Lancet* made a raid on the adulterators of foods, printing the charges openly with the names of the offending firms. From this crusade grew the British «Adulteration of Food and Drink Act» of 1860, the first comprehensive attack upon food adulteration made in the name of the public. One serious defect in this law was the shielding of the offender from publicity until the second conviction, a leniency which robbed the law of much of its power for protection. Another defect, and a fatal one, placed the penalty at «not to exceed $25,» which, of course, an active offender would cheerfully spare from his ill-gotten gains for the privilege of cheating the uneducated public. The continued success of the adulterators led to the passage in 1872 of the «Adulteration of Food and Drugs Act» which raised the penalty to a fine not exceeding $250 for the first offense, and imprisonment for the second. This seems to have been entirely too stringent for the fraudulent food manufacturers, for three years later it was superseded by the «Sale of Food and Drugs Act» of 1875. This act specifically forbids the selling to a purchaser «any article of food or any drug which is not of the nature demanded by the purchaser» under penalty of not more than $100 fine. A following section of the law throws the burden largely upon the vigilance and intelligence of the purchaser by providing that there shall be no liability under the act if the adulterations are not made fraudulently, that is, to increase the weight or bulk, or to conceal inferior quality, and provided that the customer receives notice by a label distinctly written or printed that the article is adulterated. A placard hung upon a wall in the store where the adulterated food was sold was adjudged sufficient legal notice, whether the purchaser read it or not. The burden of reading such notice was placed on the purchaser, and the adulteration of food was permitted on that basis. The warfare between the food adulterators and the agents of the people (inspectors) went on without cessation. The percentage of adulterations had been reduced from 19.2 in 1877 to 10.3 per cent in 1885, but the number of analyses had increased by 300 per cent, so that the actual number of adulterations found by the inspectors had nearly doubled. A special committee appointed to investigate the operation of the food law reported that the penalty of a fine was insufficient to deter adulterators, their profits being so enormous that they were willing to pay over and over again any fines imposed. It was therefore recommended that imprisonment should be made the penalty for the third offense. The committee's findings resulted in the «Sale of Food and Drugs Act» of 1889. This, however, was not a new law, but merely an addition to the act of 1875. It still continued to be a «labelling» act, and not a preventive of adulterations.

An outbreak in 1900 of a mysterious illness among beer drinkers turned out to be arsenical poisoning from the use in the beer of glucose made with sulphuric acid which had been obtained from iron pyrites — which is always arsenical unless specially purified. Investigation disclosed the fact that this same glucose was used in the manufacture of many common acids employed in preparing foods and medicines, and in jams, jellies, honey and candies.

In 1904, examinations of 84,678 samples of food articles revealed adulterations in 7,173 instances, a proportion of 8.5 per cent. Of all wines inspected, 17 per cent were adulterated; of spirits, 12 per cent; of milk, 11 per cent; of cocoa, 9 per cent; of oleomargarine, 7 per cent; of beer, 7 per cent; of coffee, 6 per cent; of butter, 6 per cent; of confectionery and jams, 5 per cent; of sugar, 5 per cent; of mustard, 5 per cent. At the other end of the list were bread and lard with one-fifth of 1 per cent.

In the United States public opinion was very slow in crystallizing into the Federal «Food and Drugs Act» of 30 June 1906. Several previous attempts had been made to get such a law upon the statute books, but powerful interests had succeeded in preventing it. As early as 1895 the State of Michigan had passed a very complete pure food law along practically the line of the later Federal law. Wisconsin, in 1898, had passed a still better law, and these laws with some few modifications are still in force in these States. Massachusetts in 1902, and Minnesota in 1905, antedated the Federal law with effective food laws of their own. These State laws in fact established the basis of the National law.

At the time of the passage of the law it was vigorously opposed by patent medicine manufacturers, rectifiers of spirituous liquors, wholesale grocers and druggists — a vast army who were flourishing upon practices forbidden by the new law. When it had actually become the law, the objectors at once took steps to prevent its thorough enforcement. In the act it was stipulated that the Bureau of Chemistry should decide cases of alleged adulteration. This provision was practically annulled by the arbitrary appointment of a board of food and drug inspection whose findings were made binding upon the Bureau of Chemistry. The personnel of this board was influenced by the opponents of the law, and it immediately espoused the interests of the manufacturers and not those of the public. The adulterations continued in full blast, almost as before.

The Federal Food and Drugs Act operates directly in the District of Columbia and the Territories, and upon interstate commerce and imports, but not at all upon the vast bulk of intrastate traffic in foods. The State laws alone cover the intrastate trade, and at the time of the passage of the national food law such State laws as there were along this line were lacking in uniformity. Within a year or two most of the States passed food laws following generally the national law, and unfortunately, in most cases, repeating its inadequacies. However, not a few of them have added many protective restrictions and prohibitions not existing in the national law to the very great benefit of those commonwealths.

The effect of the Federal law and the State laws which closely imitate it is twofold: (1) it prohibits the manufacture and sale of harmful foods and of all foods in which harmful substances have, for any reason, been placed; (2) it compels the truthful labelling of foods which are adulterated with harmless substances. The effect of the latter section has been to make the law primarily a labelling law, for all of the misbranding and most of the adulterations made statutory offenses under the law can be corrected and the penalties escaped by cautious labelling. The Secretary of Agriculture in his report for 1909 says: «'Adulteration' is an ugly word in the popular mind. It carries with it the idea that there is grave danger to the public health when adulterated foods are consumed. This may or may not be true. Under section 7 of the Food and Drugs Act, adulterations are of two kinds, namely, (1) those which may be injurious to health, and (2) those which are not unwholesome, but which debase the character or value of the food. Adulteration of the latter type wholly disappears when the foods are properly branded so that the consumer knows exactly what is being purchased.» The burden of selecting the food which is pure and wholesome and economical is thus made to depend altogether upon the education of the purchaser. The ignorant are the ones who will suffer, and they are the ones who need the protection which, however, the law gives to the manufacturers. For example, a jar of food labelled «Raspberry Jam» may not contain raspberries or any other fruit, but, so long as the label also contains a table of percentages of what the «jam» is composed, the manufacturer is by that label protected from prosecution for adulteration. The food may be «debased in character and value» but, in the eye of the law as explained by the Secretary who enforces it, the adulteration «wholly disappears» with the proper label.

The arrangements for the administration of the law are all that can be desired. Manufacturing in disobedience of the provisions of the law is made a crime. The penalty for a first offense is a fine not to exceed $500, or imprisonment for one year, or both; for a second offense, a fine of not less than $1,000, or imprisonment for one year, or both. For offenders outside of the manufacturing industry the penalties are less. In addition, the adulterated or misbranded goods are subject to libel proceedings, and may be seized and destroyed. The Department of Justice has charge of prosecutions, and the United States district attorneys everywhere are required to act upon the presentation of satisfactory evidence. The judgments of the courts are given publicity by the Department of Agriculture. In the year ending 30 June 1915 the Department of Agriculture transferred 767 cases of infraction of the Food and Drugs Act to the Department of Justice for prosecution: 276 for criminal proceedings and 491 in which seizures were recommended. During the year there were terminated (including 492 cases coming over from the preceding year) 501 criminal cases and 457 civil cases. In 220 of these, fines were imposed ranging from $1 up to $400. The majority of the fines were small, more than half being $25 or less: there were but 15 fines above $100. The total amount collected was $10,831. Decrees of condemnation and forfeiture were entered in 387 cases; in 209 the goods were actually destroyed; in 140 they were released on bond to be made over to conform to the law; and in 30 cases they were sold on account of the government for uses not contrary to law.

The laws of many of the States which follow in the main the Federal law are much more rigid, and a large proportion of goods salable under the Federal law cannot be sold in those States. In Alabama, for example, any foreign matter mixed with sugar syrup or molasses makes it unsalable in the State, no matter how it is labelled; in California, truthful labelling does not exempt an adulterated article from the penalties of the law; in Colorado, wines, beers and liquors containing any ingredient not normal cannot be sold however labelled; Georgia forbids absolutely the sale of bleached flour; in Michigan, maple products adulterated in any way cannot use the word «Maple» on the label; in New York, maple syrup and maple sugar and honey may not be sold if adulterated, no matter if so announced on the label; in Pennsylvania such preparations as «Coffee Compound» may not be sold; the law says it is not coffee if compounded with another substance; in Rhode Island adulterated or impure spirituous liquors may not be sold under any label; in Wisconsin the prohibitions are many and inflexible, and goods which may be sold freely in most of the other States are barred from Wisconsin trade. The State Food Department of Illinois calls the attention of the people of that State to the fact that while the Federal law forbids misrepresentation on the label, it does not require the labelling, except in a few instances. On the other hand, the Illinois law requires that «every manufactured article of food and all foods sold in package form shall be branded with the true name of the article.» Maple sugar is instanced as an example. In other States such sugar is usually sold without a label and is generally heavily adulterated with glucose and cane sugar. In Illinois it must be labelled, and it cannot be sold as maple sugar unless bearing a label declaring its purity. The department warns the people of the State that «the consumer can protect himself by reading the label, and reading all of it, not only the prominent words.» A warning is also given that though the law is complied with when the words «Artificially Colored» are placed upon the label, at the same time a deception is practised, as when green fruit is made to look like ripe, in preserves; when canned old peas are made to look like fresh; when catsup that has been made from over-ripe tomatoes is colored to look as if from new and freshly ripened fruit. Attention is also called to the trick of putting two labels on the same package, a small and inconspicuous truth-telling one on a side of the package where it is not readily noticed. The State of Wyoming requires that the full statement of contents shall be placed on the principal label. North Carolina meets this trickery by prohibiting the placing of two different labels on one package. Tennessee decides that inconspicuous type on a label is in itself an evasion of the law. In several of the States an exaggerated picture, or a name which closely resembles some well-known brand, is an attempt to deceive, and incurs the penalty therefor.

The widespread use of benzoate of soda as a preservative in certain kinds of foods had aroused so much question as to its harmfulness that upon passage of the law the Bureau of Chemistry under the direction of Dr. Harvey W. Wiley, its chief chemist, began an investigation to decide the matter. A so-called «poison squad» of healthy young men were fed with benzoate of soda in varying quantities for a period of several weeks. The most careful scientific watch was kept upon them, and detailed records were made at great length. The conclusion of the bureau was that benzoate of soda was a «deleterious substance» in the meaning of the law. Its use in foods was thereupon forbidden by the Secretary of Agriculture. The food manufacturers who were using it in immense quantities appealed from the decision of the Secretary of Agriculture direct to President Roosevelt, who suspended the decision pending a report of the referee Board of Consulting Scientific Experts which he appointed to make the examination. This board also conducted a series of experiments with a «poison squad» and brought in a report that in the small quantities used in preserving food benzoate of soda could not be proved injurious to health. The Secretary of Agriculture then issued a new ruling permitting the use of benzoate if the percentage used in the food was truthfully stated on the label. The other chemical substances claimed to be injurious to health were submitted to the same board after the Bureau of Chemistry had condemned them. After two years the board decided against the use of saccharine, and after two more years against sulphate of copper in foods. In April 1914 the board reported that alum baking powders were no more injurious than other baking powders. The question as to sulphurous acid and sulphites had not been decided up to 30 June 1915, and in all States whose food laws follow closely the Federal law, sausages and preserved meats may lawfully contain sulphites, and often in so large a percentage as to be plainly evident to the taste. In some States, however, these preservatives are absolutely forbidden, in accordance with the adverse decision of the Bureau of Chemistry, published in Bureau of Chemistry Circular 37. The controversy as to flour bleached by the so-called «nitrate» process was taken to the United States Supreme Court, which held that this process could lawfully be used under the Food and Drugs Act until distinct proof was given that the flour so bleached was poisonous, or deleterious to health. Nevertheless, many States have specifically condemned this nitrated flour, and forbidden not only its sale, but also its manufacture within the State boundaries.

Under prevailing conditions, therefore, the market is full of foods lawfully adulterated because labelled correctly as to their composition, and containing chemical preservatives lawfully permitted. It is incumbent upon the purchaser to read the labels, and decide to the best of his information whether he shall buy the goods offered at the prices asked. Some of the allowed adulterations are detailed below.

In canned, chopped or devilled meats, starch may be added to give bulk and weight, and sulphite or benzoate of soda as a preservative.

Lard may be adulterated with beef fat to which has been added sufficient cottonseed oil to give it the same melting point as lard. This adulteration is permitted if the mixture is called «Compound Lard» or «Lard Compound.»

Beef extract is adulterated by an inordinate quantity of salt. Some of the «bouillon cubes» are nearly all salt. Glycerine is added in some brands, and some are preserved with sulphite. At least one brand is «expanded» with extract of yeast.

Cheese is adulterated either by the substitution in whole or in part of some cheaper fat for the natural butter-fat of the milk: or by making the cheese of skimmed milk. The government requires that at least 50 per cent of the water free substance of cheese shall be pure milk fat, but recognizes a variety of cheese as «skim-milk cheese» under which title so-called cheese with a cheap fat filling may be legally sold. The retail purchaser has no way of finding out just what he is getting when he buys «cheese.»

Flours are more or less adulterated with the fine flour of corn. This is true particularly of package flours, and especially of buckwheat flour,. which sometimes has also an admixture of rye flour. The package is generally labelled truthfully, in which case the adulteration «disappears.» Unfortunately the price is usually the same as for pure buckwheat flour, and the purchaser has insufficient information upon which to decide what price is just. Rye flour is also adulterated with wheat and corn flour.

Baking powders are largely adulterated with starches or flours so that in several of the States the law requires a certain production of leavening gas per pound, below which the powder is condemned as adulterated.

Canned fruits are rarely adulterated except by thickening the juice with glucose. The saccharin formerly used for sweetening in place of sugar is now almost universally forbidden.

Fruit syrups are often preserved with benzoic acid, a wholly unnecessary addition. A placard hung upon the soda fountain where such syrups are used makes them lawful.

Jams and jellies have generally large percentages of glucose, a judiciously chosen coloring matter and an artificial flavor. The basis of most of these preparations is «apple stock,» made from the cores and peelings of apples which are canned or evaporated. The addition of phosphoric acid enables a jellying of the mixture with a smaller proportion of fruit and a larger percentage of water. These adulterations would «disappear» with proper labelling, but an inspection of the goods openly sold in the market will show that not even an attempt is made to comply with the law. No «unwholesome» ingredient is used, and a prosecution would at worst result in a light and easily paid fine.

Olive oil in any grade but the best is adulterated with cottonseed oil, which imparts to the olive oil neither flavor nor unusual color.

Syrups are adulterated with glucose which too often contains sulphurous acid used in bleaching it, and probably also sulphate and chloride of lime. Molasses which has been bleached with zinc and acids may carry salts of lead, tin and zinc which are distinctly pernicious.

Honey is so readily adulterated that the wonder must be that it is ever found pure. The fact is, however, that it is rarely adulterated. When it is, the chief adulterant used is invert sugar, prepared by treating cane sugar with a dilute acid. The high price of honey offers a large margin of profit. Honey in the comb is assumed to be necessarily pure, but it is a well-known fact to beekeepers that bees will store almost any kind of a sweet liquid in any empty comb they have on hand. Strained honey, therefore, is more likely to be pure than is comb honey, if the label claims purity.

Mincemeat, pie-fillers and similar substances offer a wide field for adulteration, as they have no particular formula of manufacture. Chemical preservatives and colors are the questionable adulterants. The law permits benzoate and certain coal-tar colors, if the label so states.

It is to be observed that while the foregoing specifications apply under the United States law and under most of the State laws there are some States in which the laws are much more critical, and the protection of the consumer far more efficient. See Adulteration; Foods, Recent Legislation Respecting.

Richard Ferris,
Editorial Staff of The Americana.

FOOD CONTROL LAW. The much increased demand for food from abroad as a result of the Great War made it imperative upon the United States, upon its entry into the war, to safeguard its vast food supplies, that they might be sufficient to provide not only for the home consumption and for our soldiers abroad, but for any and all shortages on the part of our allies. The methods of food control in

France and Great Britain were, therefore, thoroughly studied, and their experience drawn upon, that this nation might legislate most wisely on so important a subject. The principles of food control in Great Britain are well expressed in the words of Lord Rhondda, the food controller: «My aim is to safeguard the interests of the consumer and to do away with profiteering altogether. The framework of our machinery is formed on the civil service. They are the administrators, but we secure the best available business men to advise them, as well as expert committees dealing with every food commodity.»

After thorough study of the food problem, the United States Congress passed the National Food Control Law, which became operative 10 Aug. 1917. The act set forth that, owing to the exigencies of war, the President was authorized to make regulations for carrying out a long set of provisions, giving him very broad powers to cover all emergencies. Anything approximating bribery or influencing of officials purchasing food supplies was made punishable by not over $10,000 fine and five years' imprisonment. The destruction of food, wasteful practices, methods of limiting output or exacting of excessive prices was prohibited. The President was authorized to license parties engaged in food storage, distribution and sale, and to prohibit others from engaging in such work; licenses to be revocable for bad conduct. This licensing did not apply to farmers and retailers.

To stop hoarding of necessities methods were indicated, and violations made punishable by fine not exceeding $5,000 and two years' imprisonment. It was also provided that any District Court might seize and sell such hoarded food, returning the surplus over costs to the owners. Conspiracy to interfere with transportation, handling and distributing necessities upon conviction called for a possible $10,000 fine and two years in prison. The President was authorized from time to time to requisition foods and fuels for the army and navy and common defense, under stated restrictions; also when necessary to requisition and take over for the use of the government any factory, packing-house, pipe-line, mine, plant, etc., essential for national security and defense, providing means of payment for same.

The broadest powers were extended to the President in dealing with excessive and unjust food prices, this section being particularly aimed at control of exchanges, clearing-houses and boards of trade. Violations carried a penalty not exceeding $10,000 and four years' imprisonment.

A long section of the law was devoted to wheat prices, and the President was empowered to fix a guaranteed price to stimulate production. Regulations were inserted against the use of foods, fruits and feeds for distillation into beverages, the extent of such limitation being largely left to the President's discretion. He was also authorized to commandeer all distilled liquors needed for redistillation in the manufacture of munitions. Not over $1,000 fine and a year's imprisonment was the penalty for violation of this clause. For carrying out the provisions of the Food Control Law $2,500,000 was appropriated, and the further sum of $150,000,000 under certain provisions safeguarding the disbursements, one of which was a detailed report to Congress on each first of January.

The Food Control Law stipulates that its provisions shall end with the war with Germany, and that the exact date of termination shall be determined and announced by the President. The act goes beyond mere food, covering very completely the production and distribution of coal and coke, empowering the fixing of prices and determination of who is and who is not entitled to use coal, and permitting the taking over of mines or methods of distribution, the looking into the books and records of mine operators, and the fixing of prices, both for producers and dealers. The penalty for asking, demanding or receiving a higher price than fixed by the government, is fixed at not over $5,000 fine and two years' imprisonment. The act concludes with emphasized clauses for restricting employees and officials of corporations for acts tending to limit the supply of foods and fuels, providing not over $5,000 fine and two years' prison penalty for violation. It specifically exempts farmers in retaining their own crops so far as needed for their family use. A separate clause of the law appropriates $10,000,000 for the purchase of nitrate of soda in 1917 and 1918, this added clause being evidently an «afterthought or rider.

Immediately after the passage and approval of the law, the President appointed Herbert Hoover United States food administrator, and plans were announced for the control of wheat, flour and bread. The minimum price for wheat was set at $2 for the 1918 harvest, and as regulated by the committee wheat sold at varying prices in different cities; in Kansas City the price was $2.15; in Chicago, $2.20; in Baltimore and Philadelphia, $2.29; in New York, $2.30. Proprietors of grain elevators and mills were promptly licensed; grain exchanges were asked to suspend operations in «futures.» To conserve the wheat, the patriotism of the people was appealed to, and «wheatless days» recommended, and the use of corn, rye and even potato flour was stimulated. A $50,000,000 Food Administration Grain Corporation was formed, with all the stock owned by the United States government. The Allied governments agreed to purchase all the wheat that could be spared from American consumption, at the cost to the corporation. Leading men in the milling industry co-operated, and formed committees to carry out the objects desired. Milling divisions were established all over the country. Mr. Hoover also appointed Federal food administrators for every State in the Union. To prevent profiteering and also hardship to anyone President Wilson announced a «Fair Price Committee,» President Garfield of Williams College accepting the chairmanship, and the membership being made up of men prominent in labor organizations, food associations, agricultural colleges, chambers of commerce, etc. The wheat-purchasing division was headed by Mr. Hoover, assisted by men chosen from various associations familiar with conditions.

FOOD OF PLANTS. See PLANT FOODS.

FOOD-POISONING, a form of poisoning from food, which in times past was thought to be extremely common, but at the present time is known to occur but rarely. One of the most important features in food-poisoning is individual idiosyncrasy. It is well known that certain foods, such as strawberries and tomatoes, affect susceptible people uncomfortably, but instances of this are rare, and are often of mental origin. Epidemics of food-poisoning have occurred, as when, for instance, a baker has used a yellow coloring matter in his cake to obviate the necessity of using eggs, which coloring matter was largely made up of lead.

Food-poisoning may be classified under three main types: (1) Poisoning by means of metals; (2) poisoning by means of animal parasites; (3) poisoning by means of plant parasites, bacteria and fungi and allied organisms. The metals which have been known to cause poisoning in food are particularly arsenic, lead, copper, antimony, tin and zinc. During 1900 there was a widespread epidemic from poison by arsenic, in Manchester, England, and neighboring cities, from the drinking of beer. On investigation it was found that the arsenical poisoning, which in some cases had proved fatal, was due to the glucose used in the manufacture of the beer. This glucose had been prepared by a sulphuric acid which had in turn been made from iron pyrites containing large amounts of arsenic. It entered into the glucose, and thus became an ingredient of the beer. This epidemic was extremely severe, thousands of cases of arsenical poisoning having been observed. Lead-poisoning very frequently follows the use of water which has been conveyed through new lead pipes. It may also result from the use of leaden coloring matters used in bread, biscuit, cake, etc. Zinc and copper poisoning have resulted from the use of canned vegetables, copper frequently being used to impart a good color to the vegetable.

Food-poisoning resulting from animal parasites or from animal poisons are of extreme interest. Trichinosis from the flesh of hogs, which has been imported in pork and pork sausages, while rare in this country, is common among those people who habitually eat their sausages without thorough cooking. A form of poison results from the eating of mussels which have developed the ptomaine mytilotoxine, and similar forms of poisoning from decomposition products in meat have been observed. A special form of meat-poisoning, botulism (q.v.), is extremely common in certain countries. It seems to be due to the development of the *Bacillus botulinus*. This form of poisoning has been observed in those who have eaten ham. The symptoms are late in onset; from 24 to 36 hours after eating gastric pains with frequent vomiting occur; and constipation is at first obstinate. Practically all the cases of botulism have shown eye-symptoms. There is disturbance of vision, the eyes become fogged, the lids droop, people see double, and there is dilatation of the pupils, while burning thirst and constriction of the throat are frequent signs. Extreme muscular weakness with perhaps loss of ability to speak, or of power to empty the bladder, may develop.

Other forms of food-poisoning have been described resulting from eating sausages and other meats which were diseased at the time of killing, or which have become tainted afterward, and a number of poisonous bacteria have been isolated. *Bacillus enteritidis, Bacillus morbificans, Bacillus breslaviensis, Bacillus Friedebergensis*, have been some of the forms that have been obtained in poisonous meat. Fish-poisons are not unknown, and in Russia and Switzerland and the West Indies a number of cases have been described as resulting from fish-poisoning. A peculiar type of poisoning from milk, ice-cream, cream-puffs, frozen custards and cheeses is known. This poison seems to be due to the presence of a toxic substance which has been named by Vaughan of Ann Arbor, Mich., as tyrotoxicon.

The most important general poisons from vegetable foods are those due to eating the poisonous mushrooms, and the grains affected by ergot and allied species. Thus ergotism as found in Russia, Spain, Italy and its close ally pellagra are types of this form of food-poisoning. A well-known disease in eastern Japan and neighboring parts of Asia termed beriberi (q.v.), is thought to be due to poisonous rice. See FUNGI; MUSHROOM; PTOMAINES; TOXICOLOGY.

Through the vigilance of local boards of health, cases of ice-cream poisoning and sausage poisoning are now rare in the United States. Accidents, however, happen through prepared foods not being kept cold enough to prevent a putrefaction which cannot be noticed by any change of taste or odor.

FOOD PRESERVATION in a technical sense relates to the processes adopted for the preservation of organic substances used as food, either animal or vegetable. It is generally understood that the «spoiling» of foods and food materials is due to the activities of bacteria, and the various preservative processes are therefore contrived to prevent bacterial action. They may be considered under the following heads: (1) Preservation by cold; (2) Preservation by drying; (3) Preservation by salting; (4) Preservation by smoking; (5) Preservation by sterilization by heat and the exclusion of air; (6) Preservation by chemical or antiseptic substances; (7) Preservation with sugar and with brandy, and by pickling with vinegar in the customary household processes.

1. **Cold.**— The application of cold for the preservation of meat and vegetables may now be conducted under modern methods of applying this agent, at temperatures varying from 0° F. (— 18° C.) to 40° F. or more. In the large cold storage plants now established in many cities, in which the expansion of liquid ammonia is chiefly used for the production of variable degrees of cold, it is customary to provide several large compartments or rooms for the preservation of food in which different temperatures are maintained, fruit being kept at temperatures a little above the freezing point, and meats, fowl and especially fish at considerably lower temperatures.

In densely settled countries like England, where the land area is insufficient to produce the necessary amount of meat for the food of the people, frozen meat from other countries forms a considerable part of the food supply. If the meat is frozen before *rigor mortis* (rigidity following death) supervenes the meat keeps well, but if it is frozen later it rapidly decomposes after thawing. Freezing arrests putrefaction and has a tendency to conceal the odor of decomposition. Hence bad condition of frozen fish may not be detected until the heat necessary for cooking is applied. Meat which has been frozen is often unusually tender on account of the loosening of the intermuscular tissue by freezing; bacteria can more readily penetrate into the interior of thawed meat, and bring about rapid decomposition. Frozen meat and fish, especially when thawed too suddenly, lack the flavor of fresh meat. Bacteria in general and especially those which are concerned in the production of putrefaction, seem to be endowed with extraordinary powers of resistance to the action of cold. Colemann and Mickendrick kept flesh six hours in hermetically sealed boxes at temperatures from — 21° to — 202° F., but in every instance the flesh after being removed to a slightly warm temperature, though protected from infection, began to decompose in from 10 to 12 hours. But cold, though it may not destroy all micro-organisms, prevents the development of putrefactive bacteria. There are, however, certain bacteria which are capable of developing in frozen meat, and especially in that which is kept at about 32° F. Lafar attributes to this cause the unpleasant flavor sometimes acquired by meat which has been kept in a refrigerator for several days. This is confirmed by Popp, who says that the walls of such ice chambers when moist swarm with bacteria, which in his opinion produce the objectionable flavor often developed in stored meat. The ordinary household refrigerator has been found ineffective, less than 20 per cent registering 45° F., the degree of cold required to preserve food. Of 100 pounds of ice placed in such refrigerators 80 pounds was consumed in cooling the air which leaked in.

The Detection of Freezing in Meat.— Maljean describes a method of detecting freezing in meat by microscopic examination of the blood of the meat. A drop of the blood is expressed from the suspected meat upon a glass slide, covered with a thin glass, and examined as soon as possible to preclude solidification. The juice of fresh meat shows numerous red corpuscles of normal color and shape floating in a nearly colorless serum. But the corpuscles of meat which has been frozen are more or less distorted in form and are completely decolorized, while the surrounding fluid is relatively dark in color. On placing a fragment of such meat in a test tube, containing some water, the liquid becomes colored more rapidly and intensely than in the case of fresh meat.

2. **Drying.**— This is one of the oldest and best known of the various processes of preservation, and is applied to both animal and vegetable products. By this means, beef and fish of many kinds, grapes, figs, apples, peaches, currants and many other kinds of fruit and several vegetables are annually preserved by drying, and are thus rendered suitable for transportation to distant markets, in consequence of great reduction in weight and bulk, as well as preservation from decay. The more rapidly the drying process is conducted the better. Drying is conducted in the open air by the aid of the sun's heat, or by artificial means. The curing of fish by drying constitutes an important industry in most northern maritime countries, the principal edible fish employed for this purpose being cod and herring, of which large numbers are dried in the fishing ports of the Atlantic coast north of Cape Cod, and in the British Isles and on the coast of Norway and Sweden. Fish are prepared for drying by the removal of the entrails, slitting them lengthwise. They are then dried in the open air.

3. **Salting.**— Salting is one of the oldest and best-known methods of preserving meat and fish. The most common method of preserving meat, especially pork, is by placing the meat in casks in layers, with salt between. The salt withdraws water from the meat, and the brine thus formed penetrates the fibres of the meat. In Eckart's Munich quick-salting process, pork is impregnated under pressure with a 25 per cent solution of common salt for 24 hours and then smoked. It is claimed that by this process the loss consists, mainly, of only water and a little phosphoric acid, that the meat has a better flavor and that trichinæ, if present, are completely destroyed. As one of the results of salting meat is the removal of its natural color, it is customary to add a small quantity of saltpetre to counteract this effect. According to Lehmann, a small percentage only should be used on account of its harmful effect. A dose of five grams of this salt has caused severe illness and eight grams has been known to cause death. The effect upon the human system of the continued use of meat containing saltpetre has not been determined by observation or experiment.

Influence of Salting upon Bacteria.— Forster's experiments show that the streptococci of erysipelas and many other well-known bacteria can live for weeks and even months in salted meat. The bacilli of tuberculosis retain their virulence for more than two months, and while the bacteria of anthrax perish in less than a day, their spores retain their vitality for a much longer period.

Effect of Salting upon Flesh.— Salted meat is harder and more difficult of digestion than fresh meat. Voit shows by analysis that the nutritive value of meat is only slightly diminished after 14 days' salting. He found the percentage loss to be for water 10.4, organic matter 2.1, albumen 1.1, extractives 13.5, phosphoric acid 8.5. The amount of salt taken up by 1,000 grams of fresh meat was 43 grams. Polenske, on the contrary (Jahresbericht Nahr. u. Genussmittel 1891, p. 40), found that the meat, after being salted for three weeks, lost 7.7 per cent of its nitrogenous constituents, and 34.7 per cent of its phosphoric acid, and after three months and six months the loss was still greater. He therefore concluded that the meat was greatly altered in its nutritive character, and that it could not be used continuously without injurious effects. Salted pork constituted a very important part of the food ration of the Union army in the Civil War, and when accompanied with

	Fresh herring	Salt herring
Water	80.7	46.2
Nitrogenous substances	10.1	18.9
Fat	7.1	16.9
Ash	2.1	16.4
Salt	....	14.0

an abundant supply of fresh vegetables, it was considered a wholesome article of food. Absence of the latter, however, was often the cause of serious illness. Strohmer gives the preceding analyses of fresh and salted herring.

Caviare.— This is the salted roe of the sturgeon and other fish. It is prepared by washing the roe with salt water, leaving it in the brine for some time, pressing it, again treating it with salt water, passing it through a hair sieve, and finally packing it in salt. The most highly prized is the Astrakhan caviare, which is prepared at the mouth of the Volga. The following analyses of caviare are compiled from the works of Gobley and of König:

		Caviare	Pressed caviare
Water		43.89	30.89
Nitrogenous substances		30.79	40.33
Fat		15.66	18.90
N-free substances		1.67	......
Ash		8.09	9.88
The dry substance	N-substances	54.89	58.36
	Fat	24.02	27.35
	Nitrogen	8.78	9.36

4. **Smoking.**— The preservative qualities imparted to meat or fish by smoking are due partly to the drying action of heat, and partly to the antiseptic action of some of the substances of which smoke is composed, namely, creosote, formaldehyde and pyroligneous acid. The smoke coagulates the albumen outside of the meat, and forms a protecting envelope. The best woods for the production of smoke for preserving are hickory, beech, birch and poplar, the conifers being unsuitable in consequence of the resin which they contain. There is no loss of nutriment, and Strohmer found that smoked meat is as digestible as fresh meat. Smoking may be conducted in two ways: (1) by slowly smoking the meat for 24 hours at 77° F., or in the case of sausages and fish at 158° F., and then for a short time at 212° F.; (2) the meat may be placed directly in the hot smoke. Products prepared by the slow process have been found to contain more micro-organisms than those made more rapidly. The smoking should be continuous and not intermittent. A substitute for smoking largely employed is dipping the meat three times into dilute pyroligneous acid, allowing it to dry off in between.

The following analyses of smoked and salted meats and fish are from the works of Strohmer and König:

	Water	Nitrogenous substances	Fat	Ash	Common Salt
Ham	59.73	25.08	8.11	7.08	......
Smoked beef	47.68	27.10	15.35	10.59	......
Smoked herring	64.49	21.12	8.51	1.24	......
American bacon	9.15	9.72	75.75	5.38	......
Mackerel	44.45	19.17	22.43	13.82	11.42
Salmon	51.46	24.19	11.86	12.04	10.87

Action on Bacteria.— Serafini and Ungaro found that smoke acts energetically on pure cultures of bacteria, those of anthrax being killed in two and one-half hours, and anthrax spores in 18 hours. Bacilli in the interior of the meat were not killed. Forster found the bacilli of tuberculosis still virulent in the interior of meat after it had been salted and smoked.

During the process of salting and smoking the coloring matter of meat is changed, as shown by the spectroscope. Smoked ham and other meats have an alkaline reaction.

5. **Preservation by Exclusion of Air After Sterilization by Heat.**— In early times food was preserved to a limited extent by heating in earthen vessels, and sealing hermetically by such crude processes as were available. At the present day such methods have given place to preservation, either in tin cans or boxes or in glass. In the former instance food may be preserved for long periods by means of soldering and in the latter by means of tight-fitting joints and rubber rings. The latter method is not so much used in trade but is largely employed for household purposes. In the canning operations of the home, about one-fourth of a pound of sugar is added to the pound of fruit when it has been sufficiently cooked. The hot fruit and its juice is then poured into the glass jars up to within one-quarter of an inch from the top, the drip is carefully wiped away with a wet cloth and the rubber band is adjusted. One at a time the jars are filled full with briskly boiling water from a tea-kettle and the convex glass cover pressed down immediately into the steaming liquid and the jar clamped. The use of the boiling water not only conduces to cleanliness about the rubber ring, but, by its steam, expels the last particle of air which might supply oxygen for fermentation. The later and better method employed in home canning is that of first thoroughly sterilizing jars, tops and rubber rings; then filling with the fresh fruit and syrup, prepared from sugar and boiling water — the amount of sugar varying according to the variety of fruit; cover jars, but do not seal, and place in boiler of water. When fruit is cooked, remove jars, fill if need be with boiling water and seal. This process prevents fruit, as well as vegetables, which are also canned in this way, from cooking to pieces and does not tend to change the natural color.

In the United States the preservation of meats, poultry, fish, vegetables and fruits in this manner has become an important industry and branch of commerce, both domestic and international. The canning of meats is conducted to a great extent in those cities where great slaughtering establishments are located. The canning of vegetables and fruits is carried on at places located in the great fruit-producing regions, while the fish canneries are mostly upon the rivers and in the seacoast towns of the Northeast and Northwest States and provinces where the fish are taken from the water. The cans filled with their contents are either heated in steam retorts or partially immersed in boiling water. A small hole is left in the cover and while still hot the hole is closed with a bit of solder. In a few days the cans are tested by tapping them with a wooden mallet or hammer. If the cap sinks slowly the can has been properly sealed, but if it is elastic, and springs back, it is rejected as a "swell-head." In the preservation of corned beef, the cans are pierced to allow the water and fat to escape, and are then soldered and placed in boiling water again for several hours.

Canned-roast-beef is largely used as a part of the army and navy ration, especially during the time of war, and upon the frontier. The method of preparation is thus described by Munson: "The beef is first placed in water and maintained at a temperature of 204° F. until well cooked. It is then removed, trimmed and placed in cans, a little gelatine being added to bind the meat together. The cans are then sealed and either submerged in boiling brine or placed in superheated steam at 257° F. The steam in the can escapes through a puncture made in the top of the can which is immediately afterward closed with solder. The meat being sealed while hot, any unfilled portion of enclosed space becomes a partial vacuum when the cooling of the can condenses the steam; consequently a good can of meat will usually present a concave appearance on the outside, from atmospheric pressure.

When a can is bulged it is bad — unless frozen — and should be rejected. Freezing causes a bulging of the ends of the cans without injury to their contents. The ends, after the contents are thawed, return to their former shape, unless this mishap has been several times repeated.

The process of canning involves the making and soldering of two punctured holes in the top of each can. The presence of three such holes is evidence that the can had been imperfectly treated, and that it was reheated, the gas allowed to escape and the hole punctured for this purpose again sealed. The contents of such reheated cans are more likely to be of inferior quality than those of properly prepared cans. On this account the packers are careful to make the third puncture as inconspicuous as possible, and often to conceal it entirely by making it on the side of the can near the top and pasting the label over it. This may usually be detected by running the finger around the rim of the can.

Sometimes newly-packed cans are so much swollen that reheating is not sufficient. In such cases the cans are opened, the contents sorted and the sound parts repacked in cans as before. The quality of such articles can only be determined by opening the cans and examining their contents, which present an overcooked appearance. First-class canned goods have the name of the manufacturer and often that of the wholesale house through which they are sold upon the labels, while doubtful goods have a fictitious factory name and no dealer's name.

Canned peas are subject to great variations in quality. Dried peas are bought in large quantities, soaked, cooked and canned. Such articles can usually be recognized by their appearance and taste on opening the cans. To such an extent is this done as to have led to legislation in some States requiring all such cans to be legibly marked "soaked."

French canned peas and beans are often colored with sulphate of copper, which improves their appearance, but not their taste. The sale of such articles is forbidden in some countries.

The Composition of Canned Meats.— König found the following results in samples of canned meats and salmon. From 48 to 65 per cent of water, from 15 to 33.8 per cent of nitrogenous substances, from 0.2 to 21.6 per cent of fat and from 2.3 to 21 per cent of ash. Of the water-free substances, there were from 43 to 78 per cent of nitrogenous substances and from 0.3 to 43 of fat. The albuminous substances were generally less than those of fresh meat, the actual figures varying in different kinds of meat, from 87.06 to 93.94 per cent as much as that of fresh meat.

The preservation of food by hermetic sealing in cans has, within the last half century, grown to be an important factor in the commercial and industrial development of the United States. Before 1795 drying and the use of salt and sugar were the only methods used to any extent in the preservation of food. Nicholas Appert, a Frenchman, stimulated by the offer of a reward for a mode of preserving food for use at sea in the navy, submitted to his government a treatise upon the hermetic sealing of all kinds of food. His principle, as set forth in this work, was practically the same as that which is now in use in canning, the exclusion of air and the application of heat for the purpose of sterilization. France first purchased his process and the industry soon spread to England and Ireland.

One of the first persons who introduced the industry into the United States was Ezra Daggett, who arrived in New York between 1815 and 1818. In 1819 he was engaged in the manufacture of hermetically sealed goods, chiefly salmon, oysters and lobsters. William Underwood arrived at New Orleans from London in 1817, having learned the trade of pickling and preserving with the house of Mackey & Company. Not liking the climate of the South he went from New Orleans to Boston, where he and Charles Mitchell introduced the same industry, applying it to pickles, sauces, jams and fruit. Glass jars were at first used, but on account of their expense and fragile nature, they were soon largely supplanted by tin cans, which were introduced in 1825 by Thomas Kensett. The making of tin cans for this purpose became an important industry, various improvements being made from time to time in the processes of manufacture.

During the Civil War large quantities of canned meats, tomatoes and other vegetables and fruits were furnished both to the army and to the navy, and during the Spanish War the use of preserved meats treated with chemical antiseptics at one time threatened to become a government scandal.

According to the 1910 census there were in the United States in 1909 3,787 establishments for the canning and preserving of fruits and vegetables, fish and oysters, pickles, preserves, jellies and sauces. They employed an aggregate capital of $119,207,127. This was divided thus: $67,313,424 in fruit and vegetable canning; $18,796,180 in fish canning; $3,647,136 in oyster canning and $29,450,387 in making pickles, preserves and sauces. The total number of wage-earners employed was 59,968, and the amount paid in wages $19,081,843. (These figures and the following do not include those for the canning of meats in packing-houses, nor the canning of condensed and evaporated milk, for which separate statistics are not collected).

The States having the largest number of canning establishments were: New York, 790; Maryland, 468; Virginia, 325; Maine, 245; California, 196; Texas, 158; Indiana, 134; Illinois, 118; Ohio, 107; Michigan, 104; New Jersey, 84; Wisconsin, 83, and Delaware, 77.

The value of the products in the 10 leading States were: In California $32,914,829; in New York, $19,039,735; in Maryland, $13,709,449; in Washington, $9,595,387; in Pennsylvania, $9,484,026; in Indiana, $8,758,343; in Maine, $7,688,833; in Illinois, $7,619,586; in Massachusetts, $6,840,306; in Michigan, $4,970,911.

Of the whole number of establishments, 2,789 were devoted to fruit and vegetables, with a product valued at $91,439,161; 328 were devoted to fish, with a product valued at $25,514,436; 70 to oysters, with a product valued at $2,813,857, and 580 to pickles, preserves and sauces, with a product valued at $37,333,747. The total production for the year was 32,752,469 cases of canned vegetables; 5,501,404 cases of fruit; 400,328,767 pounds of dried fruit; 235,418,713 pounds of oysters and fish; 39,814,989 pounds of smoked fish, and 128,539,299 pounds of salted fish.

The fruits and vegetables preserved in largest values were: Tomatoes, $18,747,941; peas, $10,247,363; corn, $10,332,106; beans, $6,013,098; peaches, $3,753,698; pears, $1,833,214; apples, $1,898,720; apricots, $1,825,311; prunes, $5,130,412; raisins, $4,837,933; dried apples, $3,098,095.

The drying of fruit is confined chiefly to California, which has 84 per cent of this industry. New York comes second in this respect, with 8 per cent of the total number of pounds. Louisiana leads in the oyster canning, closely followed by Mississippi and South Carolina. Maryland leads in the canning of tomatoes, with Delaware second and New Jersey third; Illinois leads in the canning of corn, with Iowa second and Ohio third; Wisconsin leads in the canning of peas, with New York second; California leads in the canning of peaches and pears and New York in the canning of apples. Maine is the leading State in sardine canning.

Fish Canning and Preserving.— The number of establishments devoted to fish canning and preserving in the United States in 1905 was 373, having increased from 110 in 1890. Of the total number in 1905, 141 were in Maine, 50 in Massachusetts, 63 in Alaska, 36 in Washington, 25 in Oregon and 13 in California. The value of products in 1905 was $26,377,210, of which Maine produced $5,055,091, Washington $3,187,149, Alaska $7,735,782 (or about the same amount paid Russia for this territory), and Oregon $2,577,746.

By far the greatest capital employed in any single city in fish preservation was in Gloucester ($1,479,647), and secondly in Seattle, Wash., $336,620.

The canning of fish was introduced at Eastport, Me., in 1843, lobsters and mackerel being preserved in this manner. Establishments for salmon canning were started on the Columbia River in 1866 and at Klawak, Old Sitka and Cook Inlet in Alaska in 1878 and 1882. The labor in these salmon canneries is chiefly performed by Chinese. The sardine canning of Maine is next in importance to the salmon canning of the Pacific coast. Sardine is a general term applied to various small fishes, the best known being the young of the pilchard (French) and the young of the sea-herring (coast of Maine). The fish are first fried in oil and then placed in a can with oil. Olive oil or peanut oil are chiefly used in France for this purpose, and cottonseed oil in Maine.

The number of establishments engaged in oyster canning in the United States in 1905 was 69, of which 11 were in Maine, 7 in Florida and 9 in South Carolina; $2,599,563 in capital was devoted to this industry, and the products were valued at $3,986,239, of which two-thirds were produced in Maryland. In canning oysters in large quantities, steam is employed; the oysters, while in the shell, being put into a steam-tight box and submitted to the action of steam for 15 minutes, by which process they are more readily opened and made ready for canning.

The extent and importance of the food canning industry of the United States may be estimated by the fact that 400,000 persons are employed in the work of canning, manufacture of cans, packing boxes, etc. It would require 60,000 freight cars to transport a year's product; 750,000,000 cans, 2,000,000 boxes of tin plate for the cans and 30,000,000 wooden packing boxes.

6. **Preservation by Chemical Substances.** — For many years it has been the custom to employ salt, sugar, alcohol and saltpetre for the purpose of preserving meat and fish, and some of these substances for the preservation of fruits and vegetables, and no objection has been made to this practice; but in more recent times, and since preserved food has come into more general use, the practice of using other substances has also largely increased. The question whether the use of such articles for this purpose may be injurious to the health of the consumer does not appear to have been yet satisfactorily settled. The experiments of Tunnicliffe and Rosenheim would appear to show that food mixed with boric acid and borax, taken separately and together in such quantities as are ordinarily employed, may be eaten with impunity, but earlier observers have arrived at contrary conclusions. On account, therefore, of the possibility of the use of such chemicals in the preservation of food by persons wholly unacquainted with their physiological properties, legislation appears to be tending in the direction either of prohibition of the use of chemical preservatives or of regulating their use by making their presence known to the consumer. Many substances have been experimented upon with reference to their preservative quality, among which are sulphur dioxide, sulphites and bisulphites, boric acid and its compounds, fluorides, chlorides, alum, lime, sodium carbonate, formaldehyde, benzoic and salicylic acid and their compounds. At the present time benzoate of soda, boric acid, salicylic acid and formaldehyde appear to be most frequently used.

Benzoic Acid and Benzoates.— The chemical preservatives used most extensively are benzoic acid and benzoate of soda. For a time they were the subject of heated discussion. The Bureau of Chemistry decided from extended experiments that these chemicals were harmful, and recommended that they should be forbidden. The manufacturers who were using them in large quantities made a strong protest against this prohibition, and the "Referee Board" of distinguished physiological chemists were appointed to make independent tests, and report to the Secretary of Agriculture. This board in 1909 reported that sodium benzoate in "doses" up to one-seventh of an ounce daily did not exert any recognizable deleterious effect upon health, and that this chemical up to that amount could not be classed as a poison within the meaning of the Pure Food and Drug Act; and also that the admixture of such small quantities of sodium benzoate with foods did not injuriously affect their food values. The regulations of the government based on this report permit the use of not more than one-tenth of 1 per cent of benzoate as a preservative in manufactured foods, but require that its presence in the food be plainly stated on the label. In order to consume the maximum daily "dose" of one-seventh of an ounce it would be necessary to eat daily a quantity equivalent to nine pounds or five quarts of food so preserved.

Boric acid is most often used for the preservation of meats, certain kinds of fruits and catsup, and upon hams and fish. The latter are found to keep longer if the boric acid is rubbed over the outside. Two grams per kilo is sufficient for fish. According to Le Féré boric acid is eliminated slowly from the system, having been detected in the urine 40 to 50 days after it had been taken. It does not appear to interfere seriously with digestion so far as could be concluded from experiments. Cases of flesh poisoning have been reported from Switzerland, where meat had been preserved with borates, which had not acted sufficiently as preservatives, but had only masked incipient putrefaction. An investigation of the United States Department of Agriculture showed that borax and boric acid in daily doses of 800 grains will be borne by most systems for a limited period. But when used continuously or in large quantities it interferes noticeably with digestion and the general health.

Sulphurous acid and its compounds have been used to some extent for the preservation of food, but not so much at present as formerly. These compounds and especially sulphur dioxide have a powerful germicide action. Authorities differ as to their physiological action. Polli found that 8 to 12 grams of sulphurite were not injurious to adults. Ostertag, Bernatzik and Braun found that one gram of magnesium sulphite caused disorders of the stomach in women. Fischer found that 50 per cent of the preserved meat products sold in Breslau in 1895 contained sulphites, the quantity of sulphur dioxide varying from .34 to .01 per cent. According to Riche, sulphurous acid and its salts, especially calcium bisulphite, have a considerable action on meat, altering its normal condition. This action causes changes in the soluble proteid substances. An addition of 1 per cent of a sulphite to meat is not perceptible to taste or to smell. On cooking the meat the sulphite is only partially decomposed and expelled. Fischer states that meat containing more than 0.1 per cent of sulphur dioxide should be regarded as injurious to health. The United States Bureau of Chemistry in its Bulletin 84 shows that the sulphurous acid compounds produce serious disturbance of the bodily functions and injury to digestion and general health; imposing an unusual burden of work upon the kidneys.

Salicylic acid is one of the constituents of many of the modern meat preservatives. Bersch placed a portion of the flesh of a recently slaughtered animal in a concentrated aqueous solution of salicylic acid, and found that after four days the exterior of the meat was perfectly sound, but the interior showed signs of putrefaction, and contained many micro-organisms. He, therefore, concluded that the preservation of fresh raw meat by salicylic acid was not practicable. In such meat compounds as sausages and potted meat, where the salicylic acid is uniformly distributed through the mass, its germicidal properties would obviously exert a more decided action. On account of its decided taste it cannot be used so freely in meat preparations as in other kinds of food in which the taste of the preservative is concealed. Here again authorities differ as to the action of this preservative on the human economy, when used in connection with food substances. The Paris Academy has forbidden even the least addition of salicylates to food, on account of their liability to injure the kidneys or digestive organs, when any weakness of these organs exists. The United States Bureau of Chemistry condemns the use of salicylic acid and salicylates in foods as tending to reduce the weight and produce discomfort. Besides, they are wholly unnecessary in the foods in which they are used.

Formaldehyde.—In recent years formaldehyde has been introduced as a preservative in consequence of its powerful antiseptic action. A proprietary preservative known as "Carnolin" consists of a 1.5 per cent solution of formaldehyde slightly acidified. In very small amounts it exerts a decided antiseptic action on milk. The effect of formaldehyde upon the system, when employed in the small proportions required for food preservation, has not yet been well determined, but its power of forming insoluble compounds with proteid substances, and its hardening power upon animal tissues, would seem to render meat treated with it much less digestible than otherwise. Mahery and Goldsmith found that formaldehyde in the proportion of 0.2 gram per cent limited the artificial peptic digestion of blood fibrin. Ludwig states that formalin is not applicable to the preservation of meat products. Ehrich tried the effect of an 8 per cent solution of formaldehyde on various food substances. He found that horseflesh was completely preserved by it, but that the odor developed was such that the meat could not be eaten. Beef thus treated did not develop this odor, but was fit to be eaten only for a short time after addition of the preservative, on account of the chemical changes which it produced. According to Bloxam formaldehyde causes fish to become so hard as to be unsalable even if the solution contains only one part in 5,000. The United States Bureau of Chemistry found that formaldehyde retards the nitrogen and sulphur metabolisms and accelerates the phosphorus metabolism of the human body, and concludes that its presence in foods is deleterious especially to infants and invalids.

British Investigation Relative to the Use of Preservatives.— A committee was appointed in

1899 to report to Parliament upon the "Use of preservatives and coloring matters in food," the object of the investigation being to ascertain:

1. Whether the use of such materials, or any of them, for the preservation and coloring of food, in certain quantities, is injurious to health, and if so, in what proportions does their use become injurious?

2. To what extent and in what amounts are they used at the present time?

This committee held many hearings and examined 78 witnesses, among whom were the principal experts in England, physicians, health officers, chemists, grocers, dairymen and representatives of different food interests.

The committee reported that the preservatives found in use other than alcohol, oils, vinegar, salt and sugar, were boric acid and other boron preservatives, sulphurous acid, and sulphites, fluorides, salicylic acid, benzoic acid and formalin or formaldehyde. A list of 4,251 articles of food examined at the government laboratory for preservatives was presented, of which 1,659, or 39 per cent, were found to contain preservatives. These consisted of 35 different kinds of food and beverages. Of the articles examined the following named samples were found to contain preservatives, the percentages indicating the proportions to the number of samples respectively: Lime and lemon juice, 88.5 per cent; ham, 82.7 per cent; cream, 77.9 per cent; margarine, 77.4; pork-pies, 70.8; cordials, 70.8; bacon, 70.5; sausages, 66.4; fruit syrup, 65.2; butter, 57.1.

Of the 1,659 samples treated with preservatives, 1,249 contained boron compounds, 320 salicylic acid, 20 formalin and 143 sulphites.

The committee were of the opinion that preservatives should not be used in milk, since the milk producer might be liable by such use to protect himself against the immediate results of scrupulous cleanliness. Under the influence of preservatives milk may be exposed without sensible injury to conditions which would otherwise render it unsalable. It may remain sweet to the taste and smell, and yet may contain disease germs of various kinds, whereof the activity may be suspended for a time by the action of the preservative, but may be resumed before the milk is digested.

The following were the general conclusions of the committee, so far as preservatives are concerned:

a. That the use of formaldehyde or formalin or preparations thereof, in food and drink, be absolutely prohibited, and that salicylic acid be not used in a greater proportion than one grain per pint of liquid food, and one grain per pound of solid food; its presence in all cases to be declared.

b. That the use of any preservative or coloring matter whatever in milk offered for sale in the United Kingdom be constituted an offense under the food and drug acts.

c. That the only preservative which it shall be lawful to use in cream be boric acid or mixtures of boric acid and borax, and in amount not exceeding 0.25 per cent expressed as boric acid, the amount of such preservative to be notified by a label upon the vessel.

d. That the only preservative permitted to be used in butter and margarine be boric acid, or mixtures of boric acid and borax, to be used in proportions not exceeding 0.5 per cent expressed as boric acid.

e. That in the case of all dietetic preparations, intended for the use of invalids or infants, chemical preservatives of all kinds be prohibited.

The following statement appears in the 33d annual report of the State Board of Health of Massachusetts (1901). Out of 7,323 samples of milk examined with special reference to the presence of preservatives, 184, or 2.5 per cent, contained formaldehyde; 42, or .6 per cent, contained boric acid, and 7 contained carbonates. These samples were all obtained in the summer months.

Legislation Relative to the Use of Preservatives.—At present Austria has no law upon this subject. In Belgium the use of preservatives in milk is forbidden; in Denmark the use of all preservatives except salt in butter and margarine. In France the sale of food containing either salicylic acid or formalin is prohibited. In Germany, spoiled goods sold in a state concealing their real condition make the vendor liable to a penalty. The addition of alum, boric acid and salicylic acid to wine is also forbidden. The following conclusions have been reached by the Imperial Health Board of Germany regarding the use of sulphurous acid in mince meat:

(1) That mince meat can be made, if kept at a low temperature, to retain its natural color without preservatives for more than 12 hours; (2) that the addition of preservatives can improve the natural color of meat, but not the meat itself; (3) that the consumption of mince meat treated with acid salts may be injurious, especially to people of delicate health.

The Imperial Health Board has also conducted experiments that have shown danger in the use of boric acid and its compounds.

7. **Preservation by Preserving, Pickling, etc.**— In making preserves, jams, jellies and fruit juices, the sugar, vinegar, brandy and spices are the preservatives. In the case of preserves, jams and jellies, the fruits and their juices are sterilized by boiling, and a quantity of sugar large enough to render it impossible that fermentative bacteria can thrive in the product is added. This is generally in the proportion of a pound of sugar to the pound of fruit, though considerably less will suffice with most fruits. The only other attacks to be guarded against are those of mold, whose spores float freely in the air. Protection from the air is, therefore, secured by tying a waxed paper cover over the containing jar or bowl, or, better, by pouring a layer of melted paraffine wax directly on the jelly or jam. Bottles of fruit juice are corked, and the corks dipped into melted beeswax. In brandied fruits, enough liquor is added after the boiled or scalded fruit has cooled to assure a content of from 15 to 20 per cent of alcohol, which is an effective preservative.

In pickles, the preservation is accomplished by scalding to sterilize, and then adding so much vinegar as to form a liquid in which the fermentative bacteria cannot exist. The spices added to the vinegar aid in preservative effect, and so also does the sugar added to sweet pickles. See ADULTERATION; FOOD;

FOODS, RECENT LEGISLATION RESPECTING; MEAT PACKING; MILK; REFRIGERATION, etc.

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FOOD PROBLEMS AND THE WAR. From the moment that the European War started it was realized by many people that food would play an important part in deciding the outcome of the conflict. It is doubtful, however, if anybody during the early days of the struggle realized the vital importance this product would assume; and certainly none among the masses of the various populations were aware of the significance of this factor. It was only by the development of facts concerning supply, by the application of voluntary and compulsory systems of distribution and rationing, by the knowledge that starvation was depleting the peoples of some countries while shortage was being felt almost everywhere, and by a long process of education that the general public was made to recognize the great truth of the slogan: "Food Will Win the War"

The magnitude of the problem, the vast amount of adjustment and readjustment which would be necessary to make supplies equal to demands, was not grasped during the first year or two of the war. There was a food problem, to be sure, almost from the moment the first German soldier set foot on Belgian soil. But this problem with its hundreds of ramifications kept growing with the progress of the war until, long before the conflict was ended, it had become the greatest, the most absorbing, the most vitally necessary problem among all those which had to be solved. Most of the other problems of the war were in a sense national while that of food was international. It led to the appointment of international bodies to deal with its various phases and to understandings and agreements between the different countries as to what amounts of this and that product could be exported and imported. The carrying out of national measures pertaining to the distribution and consumption of food was secured by a general interallied understanding. An interallied "wheat executive" was established in December 1916, and later a "meats and fats" executive appointed by France, Great Britain and Italy, thereby providing interallied buying and apportionment of imported supplies. At the suggestion of Herbert C. Hoover, Food Administrator of the United States, there was established in September 1917, an international sugar committee in New York to centralize the purchase and allocation of Cuban and American sugars. The interallied meat and fat executive, consisting of one British, one French and one Italian representative, collected information on the monthly requirements of these countries and the purchases which they decided on were made by the allied provisions export commission consisting of members from the countries named.

There were in a general way five great problems which presented themselves in connection with the feeding of the nations outside the control of the Central Powers. One was to bring about an increased production; a second, to regulate distribution; the third, to limit consumption; the fourth, to provide for the needs of Belgium and other countries which became dependent on the Allies for their meagre supplies; and the fifth, to see that large quantities of food from the neutral nations did not fall into the hands of the enemy and thus increase his power of offensive and of resistance.

In point of time, the first of these which had to be considered was that of providing for the needs of Belgium. With that country overrun and placed at the mercy of Germany within a few months after the war had started, it was necessary to take prompt action. This was done by the appointment of a commission which under the untiring leadership of Mr. Hoover performed a task of humanitarian service such as the world up to that time had never witnessed. As far as was humanly possible under the circumstances the civilian population of Belgium was furnished by the outside nations with the necessities of life. A similar effort to provide for the needs of Poland was not so successful because of the impossibility of reaching a complete understanding on the subject with the German government. But to the extent of their ability the allied nations continued throughout the war to look out for the food demands of the unfortunate peoples who through the invasion of their territory, the cutting off of their natural resources or the loss of their crops were unable to support themselves.

The system of compelling their peoples to limit themselves to a fixed quantity of various foods was never carried out as fully in the allied countries as in Germany and the other Central Powers. By the late summer of 1916, for instance, Germany had rationed bread, potatoes, sugar, milk, meat, butter and fats, cheese, cocoa, tea, rice, macaroni and other articles, while in Great Britain in the spring of 1918 national rationing had been extended only to sugar and meat, although before that time local rationing of butter and margarine had become almost general throughout the British Isles except in the agricultural districts. Germany's first experiments were with butter tickets. Reduction of consumption in the allied countries was accomplished for the most part more largely through other methods and by popular appeals and voluntary conservation. Actual food control did not take a very definite form until toward the end of 1916, although much had been done long before that time, of course, both to increase production and to provide for proper distribution and consumption. It was not until 5 Dec. 1916, for instance, that the public meals order was issued which limited the number of courses at luncheons and dinners in hotels, restaurants and clubs. Shortly after this Lloyd George became Prime Minister, and one of his first acts was the appointment of a Food Controller.

The problem of increased production did not begin to present itself in a pressing form in Great Britain and France until the submarine warfare of Germany assumed serious proportions and began to take toll of many commerce carriers and precious cargoes of food. With the labor left at home heroic France was doing all it possibly could to keep the yield large, but between 1914 and 1917 there was a decrease of about 50 per cent in the production of that country. Great Britain was still depending to a large extent on supplies from the outside world; and in 1916–17 the United Kingdom raised only enough of its own foodstuffs to last for about ten weeks. This was increased in the following year through the plowing up of much hitherto unused land, although not by a great amount; but by the season of 1918–19 it had grown to such proportions that England and Wales were producing within their own borders wheat, oats, barley, corn and potatoes to care for the food demands for forty weeks, or four-fifths of a year. Improved methods of farming, the use of tractors and other labor-saving machinery; the addition of many millions of acres to the farm territory; the patriotic and unselfish work of women in going on the farms; and the cultivation of hundreds of thousands of small tracts in and around the cities and towns, were among the principal means by which this enlarged home grown supply was brought about.

The United States, which in the meantime had been supplying an increasingly growing amount of wheat, beef and other foods to the Allies was also devoting itself intensively to the problem of turning out vaster quantities of food stuffs. It was not until the United States entered the war in the spring of 1917 that any unusual help was required by the farmers in this direction. Even before that time they had lost some of their help which had been drawn off by munition factories that were manufacturing guns, ammunition and other material for the Allies. After the entry of the United States into the war the question of production here took on a different aspect. It was realized what the effect of the draft would be on the farmer; and so the government did all it could to help him and to make the drawing off of so much labor bear as lightly as possible on the producer. The call was made to him to plant as much as he could; emergency help to aid in gathering the harvests was secured for him through the employment service of the United States Department of Labor and the United States Boys' Working Reserve; and the use of much new machinery was advocated. At the same time another new factor in production was introduced. This was the appeal to the people living in cities, towns and villages to cultivate all the idle land, the back yards, vacant lots and open spaces and turn them into war gardens. A national organization known as the National War Garden Commission was formed by Charles Lathrop Pack, president of the American Forestry Association, to stimulate this form of food production; and the results were eminently satisfactory. As to what England was doing in the same direction, a report published in August 1918, says:

"The cultivation of these allotments is, possibly, the change most noticeable in the physical aspect of England. Everywhere in town and country evidences of the widespread interest may be seen. The 'garden' (American 'back yard') no longer is a green grass plot with borders of flowers but a vegetable garden. Potatoes are growing in the flower beds of the old moat at Windsor Castle. Parks, club grounds, vacant lots and railway borders, all are under cultivation. No space is too large and no corner too small. At this season the impression is gained that England is one vast market garden. All this food production is, of course, relieving the food condition in a great degree."

The women of France, along with the men too old for service and the boys, took up the work on the farms; and the manner in which they toiled to raise the crops needed was worthy of the same high praise as that bestowed on the brave fighters of the country.

The decrease in the production of wheat and other foodstuffs in France was accompanied by an increase in price of about 50 per cent for wheat, meat and all the main foodstuffs. In regard to the regulation of consumption and victualling the most important public provision was the buying of all wheat imports by the government. This regulated automatically the prices of native wheat and prevented speculation in interior markets. After December 1916 the food problems of France were in the hands of a Ministry of Supplies (Ministère du Raviteillement). Among the food laws which were adopted to meet the situation in France was one providing for an increase in the amount of wheat grain used in bolting for the making of flour. Another law instituted two meatless days a week and reduced the menu of meals in hotels and restaurants to three courses only. A third provided for sugar cards which reduced the monthly consumption of sugar, for each person to 750 grammes and later to 400 grammes. On 1 Jan. 1918 a new system for the control of the cereal supply of the country went into operation in France. It provided among other things for the requisition by the state of all crops of native cereals except what was retained by the grower for family consumption, for seed and for fodder for his live stock; state control of all mills; the fixing of a uniform price for flour which affected bread also; the control of all transports of cereals by rail, water or road on a system of transport permits; and the allocation to each department of a monthly quota of cereals based on a declaration of requirements in accordance with the number, occupation, etc., of the population. Bread rationing did not become an institution in France until the last days of January 1918; but the measure was approached with considerable hesitation. Previous to the introduction of this system nothing in the way of general or national bread rationing had been actually in force.

The immediate enforcement of this bread rationing was decided on after an interallied conference on the subject of distribution of grain supplies in January 1918. A flat ration was provided of 300 grammes (10.5 ounces) a day to each individual regardless of age or condition. The scheme was introduced in Paris and suburbs and gradually extended. Tickets were issued to applicants presenting sugar cards, those not possessing the latter having been required to supply proofs of identity satisfactory to those in charge. No tickets were required of individuals for bread served in restaurants; but permits were issued to the restaurants entitling them to purchase to an amount estimated on 3.5 ounces for each meal served. Up to the time this regulation went into effect the supply commission which had been established by a decree of 8 Sept. 1914 had succeeded in keeping the price of bread down by buying foreign wheat and reselling it to the departments in need; but the shortage of the 1917 crop made even the work of the commission inadequate to meet the situation. Sugar had been the first article of food subjected to rationing in France and it remained the only one until the bread-rationing scheme went into effect in January 1918.

The sugar card permitted the holder to buy one and a half pounds of sugar a month for each person in the family if all three meals were taken at home; or an annual allowance of 18 pounds for each person.

Except for a gradual and sustained upward movement of prices of most articles of common consumption the food problem in Great Britain had not offered any serious difficulties during the first two years of the war, that country having been largely a spectator of the food troubles of enemy countries; but there was a perceptible change in the latter part of 1916 and a growing belief among the working people that an unfair distribution enabled the wealthy to get supplies without trouble whereas the poor were not getting supplies without difficulty. Food control in Great Britain did not take definite form until the end of 1916 when wide powers were conferred on the Board of Trade for the use of food. Several days after the granting of this power a milling order was issued which made obligatory a 76 per cent extraction of flour from wheat. In the following month a food controller was named, Lord Devenport being the first to hold this office, which he occupied five months. He made an appeal for a voluntary ration of bread, meat and sugar. This did not accomplish all that was desired, although many people did obey the request. Profiteering became marked and Lord Devenport finally resigned. He was succeeded by Lord Rhonnda, who obtained by an Order in Council the power to deal with speculation and profiteering, and for the requisitioning of supplies and control of prices.

The first direct attempt at rationing was made in the order issued 5 Dec. 1916, regulating meals in hotels and restaurants. In February 1917 an appeal for voluntary rationing of bread, meat and sugar according to a specified scale was made. The first products after sugar to be rationed in Great Britain were butter and margarine, although meat cards followed rapidly. On 1 Jan. 1918 the weekly sugar ration was fixed at one-half pound per person. Under the rationing system one and a quarter pounds of meat per person was allowed and one quarter pound of butter. Owing to the difficulties in fixing general maximum retail prices over the whole country, the Ministry of Food allowed considerable latitude to the local food committees in fixing the charges permitted to retailers. In the first part of January 1918, the Ministry of Food issued to all local control committees a memorandum for their guidance in schemes of rationing. With the consent of the food controller any food committee was permitted to adopt any practicable scheme for controlling within its area the distribution and consumption of any article of food. An order allowing a supplementary ration to persons engaged in heavy work was issued in the spring of 1918.

The most serious situation which developed any time during the war in connection with the food supply doubtless was during the winter of 1917–18 when the ravages of the submarine and other causes had depleted the available stocks of the allies to a very low point. How near this came to being a real calamity to the cause of the Allies was not generally known until a considerable time after danger was past. Thanks to the conservation which the American people had been practising during the year or so preceding this period and to extraordinary efforts which were made to ship large quantities of food to Europe in a hurry, the critical situation was overcome. Throughout the whole North American hemisphere the crops of 1917 were in general bad. In addition to inevitable reduction of crop areas attributable directly to the war, the harvests produced were not as large as they should have been. And yet out of a scant crop in 1917 more was sent to the Allies than had been sent out of the abundant crops of the preceding years. This was due to the wonderful savings made by the conservation measures in effect in the United States. The voluntary reductions in wheat alone during the first year of the Food Administration's operation in the United States saved 125,000,000 bushels out of the normal consumption. Taking into account the fact that generally speaking the 1917 crops were far below normal and that in spite of that fact $1,400,000,000 worth of food was shipped to Europe, the accomplishments of the United States in helping to feed the Allies looms large. There was an increase of 844,600,000 pounds in the exports of meats and fats. In 1916–17 there was sent from the United States to the Allies a total of 2,166,500,000 pounds of meats and fats, which includes all sorts of meat and meat products, canned and powdered milk, butter, cheese, vegetable oils, lard, etc. In 1917–18 there was sent 3,011,100,000 pounds. That increase was the result of saving.

The full effect of the American Food Administration's work began to bear its best results in the last half of the fiscal year, 1917–18. There was a gain of 80,900,000 bushels of cereals over the amount which had been shipped in the previous fiscal year. In a letter which Mr. Hoover addressed to President Wilson giving some of the results of this year's saving, he said: "It is interesting to note that since the urgent request of the Allied Food Controllers early in the year for a further shipment of 75,000,000 bushels from our 1917 wheat than originally planned we shall have shipped to Europe or have en route, nearly 85,000,000 bushels. At the time of this request our surplus was more than exhausted. This accomplishment of our people in this matter stands out even more clearly if we bear in mind that we had available in the fiscal year 1916–17 from net carry-over and as surplus over our normal consumption about 200,000,000 bushels of wheat which we were able to export that year without trenching on our home loaf. This last year, however, owing to the large failure of the 1917 wheat crop, we had available from net carry-over and production and imports, only just about our normal consumption. Therefore our wheat shipments to Allied destinations represent approximately savings from our own wheat bread.

"These figures, however," added Mr. Hoover, "do not fully convey the volume of the effort and sacrifice made during the past year by the whole American people. Despite the magnificant effort of our agricultural population in planting a much increased acreage in 1917, not only was there a very large failure in wheat but also the corn failed to mature properly and our corn is our dominant crop. We calculate that the total nutritional production of the country for the fiscal year just closed was between 7 per cent and 9 per cent below the average of the three previous years, our nutritional surplus for export in those years being about the same amount as the shrinkage last year. Therefore the consumption and waste in food have been greatly reduced in every direction during the year."

With the allied nations in Europe dependent for 70 per cent of their deficiency in essential foodstuffs on North America, it is readily seen what an important factor the conservation systems adopted by the United States and Canada were in furnishing this deficit. The great danger which but few realized that the allied nations in Europe would be forced to make peace by food shortage was happily averted by the resolution and self-sacrifice of the people of the United States and Canada. Italy's supplies were dangerously low in December 1917, and again in March 1918, but the crisis was passed. Three meatless days a week became necessary in Italy. The weekly ration of bread for sedentary people was three pounds eight ounces of war bread, with an additional allowance for heavy workers, while macaroni, rice and maize flour were also rationed. The weekly ration of sugar was placed at two and a quarter ounces.

The world food situation as it stood in the latter part of 1918 was summed up in a resolution adopted at a conference in London of the food controllers of Great Britain, France and Italy and the food administrator of the United States. The resolution read:

"Resolved, that while the increased production of the United States and Canada renders it possible to relax some of the restrictions, which have borne with peculiar hardship upon all our peoples, yet it is absolutely necessary that rigid economy and elimination of waste in the consumption and handling of all foodstuffs, as well as increased production, should be maintained throughout the European Allied countries and in North America. It is only by such economy and elimination of waste that the transportation of the necessary men and supplies, from North America to the European front, can be accomplished, and that stocks of foodstuffs can be built up in North America as an insurance against the ever-present danger of harvest failure, and the possible necessity for large and emergency drafts to Europe. We cannot administer the food problem on the basis of one year's war. We must prepare for its long continuance if we are to ensure absolute victory."

Following his return from this European conference, Mr. Hoover made a statement in which he showed something of the great continuing demands of the Allies for food, and that too in spite of the fact, as he said, that "the harvests of France, England and Italy are better than one could expect in the tremendous drain of man-power to the front." This showed that for the year beginning 1 Sept. 1918, the Allies would have to import 500,000,000 bushels of cereals for human consumption, 4,000,000,000 pounds of fats, pork products and vegetable oils; 900,000,000 pounds of beef products for civilian consumption; 1,500,000 tons of sugar, in addition to which beef must be imported for army needs and oats for army horses. If this program was fulfilled he declared there would be no need for the drastic rationing of food among the Allies except in beef and sugar, such as had been necessary during the previous year. The world shortage in beef and sugar made it impossible to satisfy the whole need. But the program would provide an ample supply of bread and fats without the rationing of either and with their own production would give the Allies sufficient supplies, so that bread of a better quality could be allowed. Mr. Hoover said it was the "largest call for food exports we have ever undertaken;" and then added: "We can do it if we simply have the will to live with every economy and to waste nothing, and it will put us to no hardship. Our complete fulfillment of last year's promises in food and our assurances to furnish even larger supplies this next year have removed from them the last fear of hunger."

A food conservation program, effective in the United States, 21 Oct. 1918, for all places where cooked food was sold to be eaten on the premises, affected every hotel, restaurant, café, club and dining car service in the country. It carried into effect the announcement of the Food Administration issued a short time prior which stated that in fulfilling the American promise to the Allies to send them 17,500,000 tons of food during the year, the public eating places would be called on "to undertake in many particulars a more strict program than last year." There were 12 "General Orders" in the plan which set forth the specific measures by which it was proposed to carry out a direct reduction in the consumption of all foods, particularly staples, rather than a series of emergency regulations such as meatless and wheatless days and meals, and the substitution of one food for another. The proprietors were told that it had not been deemed advisable or necessary at the time to license their operation but that "in cases where the patriotic co-operation of such public eating places cannot be secured by other means, the United States Food Administration will not hesitate to secure compliance with its orders through its control of the distribution of sugar, flour and other food supplies."

The prohibition against serving any bread that did not contain at least 20 per cent of wheat flour substitutes was announced; and of this "Victory Bread" no more than two ounces could be served to a patron at one meal. No bread could be served until the first course was on the table. Four ounces of other bread, such as corn bread, muffins or Boston brown, could be served instead of the Victory bread. Only one kind of meat could be served at a meal. Bacon could not be served as a garniture. One-half ounce of butter only was allowed to a person at a meal. The same applied to Cheddar (American) cheese or butter. No sugar bowl was allowed on the table or lunch counter; and one teaspoonful was all that could be served one person at a meal. All waste food had to be saved to feed animals or reduced to obtain fats. Double cream or cream containing more than 20 per cent butter fat was prohibited.

On one memorable occasion Lloyd George said: «I fear the disciplined people behind the Germany army, the rationed family and the determination of wife and sister and daughter and mother to stand and starve so that their fighting man may be fed. I fear it more than the Imperial army itself.» In spite of numerous reports from Germany at various times during the war pointing out the shortage of food and declaring that the people were almost on the verge of famine it was shown by statistics believed to be reliable that whatever hopes were entertained at one time that Germany could be starved into submission all hope on that score would have to be abandoned. It was necessary for the Allied countries to depend on the maintenance and the conservation of their own crops for their ultimate victory rather than to count on a failure of the enemy's own supplies which were more completely controlled and regulated than were those in the nations who were fighting against them.

The food problems with which the Allies had to struggle were enormous. They kept changing from time to time and new provisions had to be adopted during the progress of the conflict. The difficulties which had to be met and overcome were tremendous. They required the most consummate handling, the employment of the best brains of the countries involved and a vast amount of administrative work in addition to the education of whole peoples to the needs of the time. The exertion of strenuous efforts to bring about increased production, accompanied by enforced or voluntary systems of conservation on all the various articles of food, were the main factors in the successful solution and carrying out of these vital problems.

CHARLES LATHROP PACK,
President of the National War Garden Commission.

FOODS, Recent Legislation Respecting. The Food and Drugs Act of 30 June 1906 commonly called the «pure food law» went into effect 1 Jan. 1907. It forbids the importation into the United States, the exportation from the United States, the introduction into interstate commerce and the manufacture and sale in the District of Columbia and the Territories, of misbranded and adulterated food and drugs. The term food is defined to include all articles used for food, drink, confectionery or condiment by man or animals. It is to be deemed misbranded if any substance has been mixed or packed with it so as to reduce or lower, or injuriously affect its quality or strength; or if any substance has been substituted wholly or in part for the articles; or if any valuable constituent has been wholly or in part removed; or if it be mixed, colored, powdered, coated or stained so as to conceal damage or inferiority; or if it contains any added poisonous or deleterious ingredient; or if it consist in whole or in part of any filthy, decomposed or putrid animal or vegetable substance; or if it is the product of a diseased animal, or one that has died otherwise than by slaughter.

It is deemed misbranded if it be an imitation of, or offered for sale as, another article; or if it be labelled so as to deceive or mislead the purchaser, or purport to be imported when it was not; or if the contents of the original package shall have been removed and other contents shall have been placed therein; or if it fail to bear a label stating the amount of any certain drugs (designated) contained therein; or, being in package form, the content in weight or measure is not plainly stated on the outside of the package; or if the package or its label shall bear any statement, design, or device (including pictures), which shall be false or misleading in any particular. But, in the case of food mixtures or compounds sold under distinctive (that is, trade or proprietary) names, they shall not be deemed misbranded if the label states where the article is produced or manufactured, or, in the case of compounds, imitations or blends, if they are so labelled. Manufacturers of proprietary foods are required to state on their labels the percentages only of such ingredients as the Secretary of Agriculture shall deem needful to assure freedom from adulteration.

Unlabelled foods in packages are adjudged misbranded if they are imitations. Untruthful geographical names are forbidden.

Food products for export may contain added ingredients not permitted in foods to be sold in the United States, when the addition of such substances does not conflict with the laws of the country to which such food products are to be exported, and when such additions are made at the request of the foreign purchaser.

Articles condemned as being adulterated or misbranded, or of a poisonous or deleterious character, are to be confiscated by the government and destroyed, or sold under conditions not contrary to the provisions of this act.

Dealers are exempt from prosecution under this law if they can establish a genuine guaranty by a wholesaler, jobber, manufacturer or «other party» residing in the United States, from whom the unlawful articles were purchased.

Under rulings of the Department of Agriculture seven coal-tar colors may be used in foods, viz.: 107 Amaranth; 56 Ponceau 3R; 517 Erythrosin; 85 Orange I; 4 Naphthol Yellow S; 435 Light Green SF; 692 Indigo disulfoacid. The prefixed numbers identify the dyes as listed in A. G. Green's 'Survey of Organic Coloring Matters' (1904). The law is administered under the direction of the Secretary of Agriculture and provides that the Secretary of the Treasury, the Secretary of Agriculture and the Secretary of Commerce and Labor shall make uniform rules and regulations for carrying out its provisions. Such regulations have been made and are printed, together with the act, for distribution by the Department of Agriculture (Chemistry Bureau Bulletin 112). The opinion of this department regarding various features of the law is expressed in Food Inspection Decisions published from time to time from the office of the Secretary. Under date of 17 Oct. 1906, 40 rules and regulations for the enforcement of the act were adopted by the three secretaries. Since then, up to 23 July 1910, seven of these regulations (Nos. 3, 9, 15, 17, 19, 28 and 34) were amended by Food Inspection Decisions. These amendments refer to sections of the law relating to the collection of samples; change in form of guaranty legend; permitting the addition of harmless coloring matter or flavors in proportion not to exceed 1 part to 800 of the food; permitting the use of seven specified coal-tar colors; forbidding the use of saccharine; permitting benzoate of soda in any amount if stated on the label; relating to arrangement and size of type on labels, character of name, labelling of derivatives, denaturing and permitting the use of copper salts and sulphur dioxide if so stated on the label.

The organization conducting the enforcement of the Pure Food Law includes: (1) Inspectors who procure samples for analysis and information regarding the manufacture and sale of food and drugs; (2) chemists and clerks, in the laboratories of the Bureau of Chemistry in Washington and in the branch laboratories in other cities, of which 19 are in operation; (3) Board of Food and Drug Inspection, whose duties are to consider all questions arising in the enforcement of the Food and Drugs Act, upon which the decision of the Secretary of Agriculture is necessary; to consider and supervise all correspondence involving interpretations of the law; and to conduct hearings based upon alleged violations of the Food and Drugs Act. Information secured by the inspectors and laboratories regarding violations of the law is reported by the chief of the Bureau of Chemistry to the Board of Food and Drug Inspection which, when the charges appear to be sustained, makes recommendations to the Secretary of Agriculture regarding the exclusion of adulterated and misbranded food and drugs offered for importation, and prosecutions for the sale of domestic goods in violation of the law. All persons charged with violations of the law are afforded a hearing at which they may introduce testimony. When requested, the hearing is conducted personally by the Secretary of Agriculture. The act provides that its penalties shall not be visited upon dealers protected by a guaranty by a resident of the United States that the articles complained of are in accordance with the provisions of the law, and in enforcing the law the department attempts to protect the retail dealer who may be acting in good faith, and to place the responsibility upon the shipper or manufacturer who is aware, or should be, of the nature of the product. The enforcement of the law naturally proceeds along two lines: First, products imported into the United States from foreign countries; and second, products manufactured or sold in the District of Columbia or the Territories introduced into interstate commerce, or exported from the United States. In the case of imported foods and drugs no prosecutions are made. The effort of the department in enforcing the law is confined to preventing the importation of illegal goods and causing their reshipment beyond the jurisdiction of the United States.

From the nature of the case the method of inspecting domestic foods and drugs is necessarily widely different from that employed with imported goods. For this purpose inspectors visit all sections of the country to secure samples for analysis and such information as may be required by the department. One inspector is located at each of the branch laboratories and others have their headquarters at Burlington, W. Va., Des Moines, Oklahoma City, Dallas, Tucson, Salt Lake City, Spokane and Fargo.

The duties of the inspectors are as follows: (1) To investigate the wholesale and retail market and obtain samples of foods and drugs shipped in interstate commerce; (2) to inspect manufacturing establishments and secure information in regard to the nature of the foods shipped in interstate commerce; (3) to investigate the manufacture and use of substances which are or may be employed for the adulteration of foods and drugs and methods of preparation which may lead to the damage or deterioration of foods and drugs, or to the use of improper materials in their manufacture; (4) to inspect foods and drugs imported at ports where branch laboratories have not been established. Special investigations are frequently made concerning sanitation and processes of manufacture. The efficient and complete enforcement of the law depends to a large degree upon the originality and initiative of the inspectors.

The act provides that the determinations as to adulteration and misbranding shall be made in the Bureau of Chemistry of the Department of Agriculture. In the division of foods of this bureau, there is a special laboratory for investigating the methods of preparation and purification of edible oils, fats and waxes.

In the division of drugs of the same bureau, laboratories were established 1 July 1908, as follows:

(1) A drug inspection laboratory, for the examination of drugs sampled in connection with the enforcement of the Food and Drugs Act, excepting those for which special arrangement is made at the branch laboratories. This includes a general investigation of drug products, bought on the market, to determine their standard composition and adulterants.

(2) A synthetic products laboratory, to investigate synthetic products and preparations containing them, develop methods for the analysis of organic synthesis, and study the preparation of organic compounds and their analysis.

(3) An essential oils laboratory, to investigate the essential oils and products in the manufacture of which the same are used. This necessitates studies relative to the chemical constitution and physical character of essential oils, the development of methods of analysis, and the improvement of those now existing; also the study of analytical processes for the examination of products containing essential oils.

(4) A pharmacological laboratory to investigate the pharmacological action of drug products under the Food and Drugs Act. This includes a study of the physiological and pathological effects produced on animals by the medicinal substances which enter into the compositions of commercial drug products and by the derivatives and preparations of the same. See PHARMACOPŒIA, REVISION OF.

There is also a miscellaneous division in the Bureau of Chemistry, the principal lines of work of which are the examination and study of waters, cattle foods, forage crops, grains, insecticides and fungicides, trade wastes and certain hygienic problems.

The Bureau of Chemistry publishes a great many bulletins and circulars, a list of which can be obtained by application to the Department of Agriculture.

In the several States, legislation has in the main been in uniformity with the National Food and Drugs Act. The general tendency is toward stricter regulations, with certain local peculiarities.

Alabama.— The Food and Drugs Act of Alabama was approved 26 Aug. 1909. It is administered by the commissioner of agriculture and industries. It follows closely the Federal law, but specifies particularly the mixing of «any foreign matter or substance» with sugar, syrup or molasses, lard and butter, and makes liable to the law's penalties any clerk or agent who shall act for an owner in the sale of prohibited foods. It forbids the sale of all forms of fabricated imitations or adulterations of spirituous, vinous or malt liquors even if so labelled. The manufacture of «compound lard» is permitted within specified limits.

Arkansas.— The Arkansas Food and Drugs Acts, 28 May 1907, and amended 31 May 1909, are administered by the State commissioner of mines, manufactures and agriculture, with the aid of the State Board of Health whose duty it is to examine specimens of foods or drugs which may be offered for sale in violation of the act. This board reports its findings to the commissioner of mines, manufactures and agriculture, who prosecutes offenders. The Arkansas law follows closely the Federal law but is more rigid. It forbids particularly the addition of burnt sugar or any other coloring matter or saccharine to vinegar or cider. To be exempt from prosecution for the sale of adulterated articles an Arkansas dealer must cite guaranty by wholesaler in the State. Foods prepared under «coined names» are not thus exempted from conforming to the law, and the ingredients must be designated.

California.— The California law was approved 11 March 1907, and amended 22 Feb. 1909, 13 March 1909 and 26 April 1911. It is administered by the State Board of Health. It follows the Federal law but is more stringent. Truthful labelling does not render an adulterated article exempt from penalty. Guarantees to be accepted must be under the State law and by a resident of the State. The laws of this State are strong in their application to dairy products and wines especially. It is unlawful for any person «to produce, manufacture or prepare for sale, or to sell, or offer for sale, or have on hand for sale, any milk or product of milk to which has been added, or that may contain, any compound of boron, salicylic acid, formaldehyde, or other chemical or substance for the purpose of preventing or delaying fermentation.» Likewise, it is unlawful to produce, etc., any milk, cream or condensed milk to which any coloring matter has been added by any person, or to which any gelatin or other substance has been added to increase its consistency, or make it appear richer; but it is not unlawful to use harmless coloring matter and common salt in butter and cheese. The windows and doors of all places where foods are made must be screened, and rigid cleanliness is prescribed. Pure wine in California is defined as in the laws of the United States relating to the fortification of pure sweet wines. A uniform wine nomenclature is in force, consisting of the use of the prefix «Cal» or «Cala» to the name of any kind, type or abbreviation of name of wine; as, for example, «Calclaret,» «Calburgundy,» «Calariesling,» etc., in stamping or labelling.

Colorado.—The Pure Food Law of Colorado was approved 7 March 1907. Federal food standards are adopted «as far as they conform to the Colorado laws.» All chemical preservatives are forbidden excepting only benzoate of soda in quantity not to exceed one-tenth of 1 per cent. Wines, beers, and spirituous liquors containing any ingredient not normal to such liquor are adjudged «spurious and adulterated» and may not be sold in the State. Almost any other adulterations of foods are permitted if they are not unwholesome, and the details of the adulteration are truthfully stated on the labels. Colorado has a strong enactment prohibiting the sale of tainted or diseased meat. It prohibits preservatives and artificial coloring matter in sausage, except such as may be allowed by the United States Department of Agriculture; and it provides for inspection of canning and similar establishments, excepting those where the United States Department of Agriculture maintains regular inspection. Any adulterated or misbranded article is declared a nuisance, to be abated in usual court proceedings.

Connecticut.—This State has given especial attention to dairy laws. Its Pure Food Law was approved 31 July 1907 and amended 26 July 1909. It is administered by the State dairy and food commissioner with the co-operation of the director of the Agricultural Experiment Station. The law in general follows the Federal law and in addition provides minute instructions for labelling and branding foods and drugs of all kinds. Specific regulations prohibit saccharine, boric acid and borates, salicylic acid and salicylates and formaldehyde. Bleached flour may not be made or sold in the State; and sugar may not be added to canned vegetables. Rice may be coated and copper salts used to green vegetables and pickles if the labels so state. Underground bakeries are disapproved and to be eliminated. A scale of allowances of legal shortages in weights and measures ranges from one-half ounce in the pint to one-eighth ounce in the pound, from the statement on the label.

Delaware.— The Delaware Pure Food Law was approved 9 April 1907. It follows the Federal law closely with the following exemptions: «(1) Where the order calls for an article of food or drug inferior to such standard and such difference is made known at the time; (2) where the article of food or drug is mixed with any matter or ingredient not injurious to health and not intended fraudulently to increase its bulk, weight or measure, or conceal its inferior quality, if at the time such article is delivered to the purchaser, it is made known to him that such article of food or drug is so mixed.» The standard measure of milk and cream is specified as 57.75 cubic inches to the quart.

District of Columbia.— The Federal law applies directly in the District and there are added specifications as to the amount of butter fat in milk; the prohibition of salicylic acid in cider and of alum in bread; and the same exemption from standards when so ordered as in the Delaware law. The prevention of the sale of unwholesome food and the distribution of medicinal and poisonous substances is regulated by the Health Department.

Florida.— The Florida Pure Food Law was approved 5 June 1911. It is administered by the commissioner of agriculture with the aid of the State chemist. An elaborate schedule of standards of purity for food products is in force. These standards are based upon data representing materials produced under American conditions and manufactured by American processes or representing such varieties of foreign articles as are chiefly imported for American use. A departure of the article above the maximum or below the minimum limit prescribed is evidence that it is inferior or of abnormal quality. Bleached grain and flour and all chemical preservatives and antiferments are prohibited. Oysters may not be floated, nor green citrus fruits «colored» by artificial heat, nor may copper salts be used to green vegetables or pickles. The schedule of standards is published by the State Department of Agriculture at Tallahassee. The commercial fertilizer, feeding stuffs and cottonseed meal laws are specifically retained.

Georgia.— Bulletin No. 51, published by the commissioner of agriculture, in 1910, contains the Food and Drugs Law approved 21 Aug. 1906 and amended later, and also the rules and regulations. It contains also a report on all foods and drugs inspected and analyzed from 1 June 1908 to 1 June 1910, including the names of manufacturers and dealers. Georgia forbids in food saccharine «absolutely,» also formaldehyde, boron compounds, sulphurous acid and sulphites, salicylic acid, fluorides, abrastol and beta-naphthol. Sulphur dioxide is permitted, but an «abnormal quantity» is forbidden. Flour bleached with nitrogen peroxide cannot be made or sold in the State. Saltpetre (for the present) and cereals are allowed in sausage, but the label must so state. Copper salts in vegetables and pickles are permitted when the label states such use. No compound can be named after one ingredient. Unfit food carelessly sold renders the seller liable for damages. Any person adding dirt or rubbish or any other material to cotton, wool, provisions or other article to add to its weight is to be adjudged a «common cheat» and punished by fine and imprisonment. The law is administered by the State Department of Architecture. Particular attention has been given to the sale of damaged corn, which produces the disease pellagra. The standards of purity of foods and drugs of the United States Department of Agriculture are the official standards of Georgia. The standards for lard, mixed edible fats and cotton-seed oils, however, are defined by the Georgia law.

Hawaii.— The Federal law applies directly. The sale of intoxicating liquors that are adulterated is prohibited.

Idaho.— The Pure Food Law of Idaho follows generally the Federal law. It was approved in March 1911 and is administered by the State dairy food and sanitary inspector. Bulletin No. 5 of the Board of Health, published in October 1909, gives the food and drug standards of this State. All animal and vegetable products and beverages are standardized. Chemical preservatives are forbidden, excepting only benzoate of soda in quantity not exceeding one-tenth of 1 per cent. Saccharine and salts of copper, zinc and other metals may not be added to foods, and vegetable substances may not be added to sausage or other meats. Foods sold under coined names are not exempted for that reason. Adulteration of wines, beer and spirituous liquors by any substance not a normal constituent is unlawful. Foods made with lard substitutes in bakeries, hotels and boarding-houses cannot be served except with a printed card stating the fact. Slaughter-houses, creameries and dairies are subject to careful regulation; and there are general regulations in regard to labelling, branding, adulteration, cold storage, imitations, etc.

Illinois.— The Illinois Dairy and Food Law was approved 14 May 1907 and amended 14 June 1909 and 6 June 1911. A State food commissioner looks after the enforcement of the laws relating to adulterated and unbranded foods. Standards of purity and strength have been fixed for a few articles in the act itself. The making or selling of adulterated spirituous, malt or vinous liquors is prohibited; also the sale of unclean or unwholesome dairy products and meats. A board of live-stock commissioners make, by the State veterinarian or a live-stock inspector, an examination of animals which they believe to be afflicted with any contagious or infectious disease, which would render the carcasses unfit for human food, and have power to confiscate and kill such animals. Chemical preservatives, except benzoate of soda to the amount of one-tenth of 1 per cent, are forbidden. Hamburger steak, however, may contain sulphite to the amount of thirty-five one-hundreths of 1 per cent, if so labelled. Bleaching and subsequent coloring of food is permitted if the labels so state, but bleached flour it deceptive and so unlawful. No preservative may be added to milk and cream. Saccharine is permitted if the label so states. Bulk foods compounded and wholesomely adulterated cannot be sold unless notice is given to each customer by placard. Any wording on the label which deceives in any way renders the article misbranded.

Indiana.— The State Board of Health regulates the enforcement of the Pure Food Laws of this State which were first enacted in 1907, following the Federal statute. The Sanitary Food Law of 1909 provides for the sanitation of bakeries, canneries, packing-houses, slaughter-houses, dairies, creameries cheese factories, confectioneries, restaurants, hotels, meat markets, and all other food-producing establishments, and vehicles in which food is placed for transportation. Section 8 of this law provides that «No employer shall require, permit or suffer any person to work, nor shall any person work, in the building, room, basement, cellar or vehicle occupied or used for the production, preparation, manufacture, packing, storage, sale, distribution and transportation of food, who is afflicted with any infectious or contagious disease.» The law specifically prohibits the use of any arsenic, formaldehyde or antiseptic injurious to health. Sugar substitutes are forbidden in foods and alum may not be added to pickles. Bleached flour may not be sold. The labels on all compound foods must bear first among the ingredients the name of the one in largest proportion. The Board of Health authorizes the issuing of letters or orders by the State food and drug commissioner relating to such subjects as sidewalk display of foodstuffs, sausages with cereal added, etc. These are for the guidance of the trade.

Iowa.— A ruling under the 1907 Pure Food Law of this State points out that this State law «cannot touch the shipment or sale of foods across the State line and that for this reason the manufacturer without the State is perfectly safe, so far as prosecutions are concerned, in sending into this State goods that do not comply with the Iowa law.» The law was amended 6 April 1909 and 14 April 1911. Strict rules are in force as to the sanitary protection of all foods on sale and in the process of manufacture. A guaranty by others does not exempt the dealer. The national and State laws are quite different in their labelling provisions and goods sold in this State must bear the labels required by the State law. The two laws are nearly alike in regard to prohibition of ingredients, such as chemical preservatives, harmful colors and flavors and similar adulterations which are prohibited by both laws. In the case of goods which, to be legally sold, require specific form of labels, the provisions of the two laws are different and the dealer who buys to sell again inside this State cannot rely upon the national guaranty for his labelling under the Iowa statute. In the case of compound and mixed foods the name first upon the label must be that of the largest ingredient. The laws of Iowa are strong in regard to dairy products; standards fixed for various kinds of vinegar are also notably complete; floated oysters and shucked oysters to which ice or water has been added are specifically declared adulterated.

Kansas.— The Food and Drug Law of this State was approved 14 Feb. 1907 and amended 12 March 1909. It is administered by the State Board of Health. It is almost an exact copy of the Federal law, the only difference as applied to foods being that in section 6 under the definition of food, as used in this law, are added the words «or in the preparation of food.» These added words are meant to cover all condiments, flavors, extracts, baking powders and such other articles as enter into the preparation of food, which is not clearly set forth in the national law. In section 7, under «Foods,» the word «tainted» is inserted in the Kansas law, but does not appear in the national law. This is for the purpose of covering certain unwholesome products that may not be decomposed in the strict sense of the word, but which may be tainted with gases or ptomaines. Also, in section 8, the word «arsenic» appears in the Kansas law with contained drugs required to be mentioned on the label. The regulations provide for the sanitary cleanliness of apartments and furnishings of all factories and stores where food is made or sold and of all vehicles in which it is transported. Sidewalk displays must be dust and fly proof. Oysters may not contain added water and must test to 10 per cent solids. Meat products may not contain sulphites or any secret preparation. All fish, fowl and game animals, rabbits, etc., placed in cold storage must first have the entrails drawn.

Kentucky.— The Pure Food Law of Kentucky was approved 13 March 1908 and amended 25 March 1909. It is administered by the director of the Agricultural Experiment Station who makes analysis of samples of food and drugs which are manufactured or on sale in the State, or are suspected by the Board of Health or Board of Pharmacy of being adulterated or misbranded, at the fixed fee of $7.50 and necessary expenses. He fixes standards of purity, quality or strength when such standards are necessary, or are not fixed by statute. The standards of the United States Department of Agriculture are followed wherever possible. Adulterations, if not unwholesome and truthfully stated on the label, are permitted. Every buyer of foods which have been bleached by sulphurous acid must be notified personally or in writing to that effect. Benzoic acid and benzoates are declared injurious to health and foods containing them may not be sold. Guarantees to be protective of the retail dealer must be by a resident of the State.

Louisiana.— The food and drug regulations of the Louisiana Board of Health were established 7 July 1906 and have the force of law. They are a lengthy detailed schedule of standards in connection with a general law, very nearly the same as the national Pure Food Law.

Maine.— The Maine Food and Drug Act was approved 28 March 1911 and is administered by the director of the Maine experiment station. It follows closely the national Pure Food Law. Pure milk and water are protected by special legislation. Lobster meat must be sold in the shell. Sulphurous acid is permitted in molasses and dried fruits «for the present.» Adulterations which are «fraudulent» are forbidden. Veal from calves less than four weeks old may not be sold in the State. Plumping scallops in fresh water is specifically prohibited.

Maryland.— The Maryland Food and Drug Act was approved 5 April 1910. It is administered by the State Board of Health. Federal standards are adopted for foods generally. Ice-cream is specifically defined and must contain not less than 4 per cent of milk fat and may have eggs incorporated with it and not to exceed 1 per cent of gelatine or vegetable gum. Such ice-cream may be sold without label. When containing more than 4 per cent of milk fat it must be labelled and the percentage stated. Nut ice-cream must contain 6 per cent of milk fat. Floated oysters may be sold if so labelled. Benzoate of soda is permitted to the amount of one-fifth of 1 per cent and sulphur dioxide to the amount of thirty-five one hundredths of 1 per cent.

Massachusetts.— The pure food regulations date back to 1902 and are administered by the State Board of Health. The 1911 revisions incorporate many provisions of the Federal law. All chemical antiseptics except saltpetre are prohibited. Sellers of oleomargarine are licensed but the possession or sale of imitation butter is prohibited. The sale of candy containing more than 1 per cent alcohol to a person under 16 years of age is prohibited. Various other articles are the subject of special enactment, such as vinegar, meats, dairy products and fish. Monthly bulletins are issued by the State Board of Health showing results of inspections.

Michigan.— A dairy and food commissioner directs the enforcement of the general food law passed in 1895 prohibiting and aiming to prevent adulteration, misbranding, fraud and deception in the manufacture and sale of articles of food and drink, and drugs. Several public acts refer specifically to various articles, including buckwheat flour, cheese, vinegar, renovated butter, corn syrup, ice-cream, etc. Articles containing benzoate of soda «or other harmless preservatives» must be so labelled. Imitation jellies and jams may be sold under truthful labels, but they must not be colored in imitation of the real. Maple products, if adulterated, must not have the word «maple» on the label. The law is published with a digest of rulings on some of these articles.

Minnesota.— The General Pure Food Law of 1905, amended in 1907, is administered by the dairy and food commissioner. Various articles of food have received special enactment for the protection of the public against impurity, imitation and fraud. Any false or misleading statement, design or device on labels is unlawful. A distinction must be made in labelling for example, between pure honey and honey substitute, and between raw linseed oil and boiled linseed oil. Intent to deceive is made the test for penalizing adulteration, and the sale of adulterated goods. The making, selling or serving of adulterated liquors is forbidden. The sale of the veal of calves killed when less than four weeks old is prohibited. There is a strong act relating to the inspection of canneries, and establishing grades for canned fruits and vegetables. Various rulings and regulations define the standards and methods of labelling of other articles.

Mississippi.— A pure food law was passed 15 April 1910, following closely the Federal statute. The State chemist is charged with its enforcement. Underweight of flour, meal, pork, etc., is unlawful, and forfeits the articles. Preservatives in sausages are forbidden. Any sale of food known to be unwholesome is unlawful.

Missouri.— The Missouri Pure Food Law was approved 13 March 1907. The definitions of adulteration and misbranding, and provisions relating to exemption under guaranty, inspection, prosecution, etc., are the features of this law, as in nearly all the States. The United States standards of purity have been adopted. There is a special act relating to the inspection of apiaries to detect diseases among honey bees. There is also a Bureau of Dairying. The Department of Food and Drug Inspection has issued a handbook of the laws, which are both general and special, with rules and regulations, standards for foods and liquors, notes and comments. Bleached flour and coated rice may be sold if labelled accordingly. Borax and sulphite may not be added to sausage or other meats. Spirituous, vinous and malt liquors may not be adulterated except by druggists in making medicinal preparations. Substitutions of ingredients in package foods are permitted if they are not injurious, of equal food value, and the label so states, but saccharine may not be substituted for sugar.

Montana.— The Food and Drugs Act was approved 8 March 1911. It is administered by the State Board of Health, under extended and explicit regulations. The Montana law is modeled on the Federal law, but elaborates some of the protective provisions. No adulterated foods of any kind may be placed on the tables of hotels, restaurants or boarding-houses unless placards are conspicuously placed stating that «Harmfully adulterated foods are not served.»

Nebraska.— The Food and Drug Act went into effect 5 July 1907, and was amended in 1909 and 1911. It is administered by the Food, Dairy and Drug Commission, and executed by the governor as special commissioner. In the main it follows the Federal law, but is more explicit, and has some special provisions. Oleomargarine may not be sold if colored. Butterine may be served at public tables only if notification to that effect is given to guests. Ice-cream is adjudged adulterated if it contains less than 14 per cent of butter fat. Provisions against bleaching of foods are suspended in the case of flour bleached by nitrogen peroxide. Coated rice may be sold if labelled accordingly. A deceptive label renders the goods under it misbranded. A guaranty does not protect the retail dealer unless given by a resident of the State.

Nevada.— The Food and Drugs Act was approved 13 March 1909, and is administered by the State Agricultural Experiment Station as a board of control. It is modeled on the Federal law, but makes many specifications in addition. Foods are misbranded if the name of the real manufacturer and the location of the factory are not given on the label. Liquors may not be adulterated with any substance which injuriously affect their «quality, purity or strength.» Sausage may contain cereal additions only if so placarded in the shops where sold, or so labelled on each package. Meat products may contain sulphur dioxide to the amount of thirty-five hundredths of 1 per cent, or benzoate of soda to the amount of one-tenth of 1 per cent.

New Hampshire.—The Food and Drugs Act of 7 March 1907, amended 6 April 1909, is, with one or two exceptions, like the national act, and there is co-operation of action between the State and Federal authorities. The State Board of Health issued a sanitary bulletin under date of October 1907, containing the pure food and drug laws of the State. It is made up of various separate statutes passed from 1895 to 1907, inclusive, relating to candy, vinegar, dairy products, etc., and also the general act with the rules and regulations for enforcing it. Adulterations to be permissible must be wholesome and truthfully labelled. Chemical preservatives, excepting «common salt and saltpetre» are forbidden. An exception is made of benzoate of soda only when the board decides it necessary to preserve the food for successful marketing. Concerning the form of guaranty, a special notice is given to the public as follows: "For self-protection, every dealer in New Hampshire should demand of the manufacturer or jobber a guaranty that the foods comply with the New Hampshire laws; and, further, the foods should be so marked, upon their receipt, that he may be able to identify, conclusively, the vendor, else he will be deprived of the protection provided for in the guaranty."

New Jersey.— The New Jersey Food and Drug Act was approved 20 May 1907, and amended in 1908, 1909, 1911 and 1912. It follows closely the Federal law, but specifically provides that the oleomargarine law shall not be affected thereby. It is administered by the State Board of Health, which has formulated an exhaustive schedule of rules. The board published a pamphlet of the important acts relating to the sale or distribution of food or drugs. The national rules and regulations and food inspection decisions, in so far as they are applicable to the Food Law of their State (Revision of 1907) are regarded as indicating the policy of the board with respect to the enforcement of the act. The act contains several distinct prohibitions relating to the manufacture and sale of various articles. The board enforces an elaborate schedule of food standards; vinegar and bread being the subject of special enactments.

New Mexico.— The food laws of 1897 prohibit adulterations which are injurious to health or which are fraudulent in effect, and all sales of damaged goods unless purchaser is notified to this effect. Goods delivered to a purchaser must be those asked for, without substitution or adulteration.

New York.— The Pure Food Law of 1909 is administered by the State commissioner of agriculture. Bread, dairy products, adulterated vinegar, feed for animals, diseased animals, apples, pears, peaches and quinces are the subjects of special enactment; but the laws relating to adulteration or misbranding of food and food products rest upon two brief sections following the definitions of the Federal statutes in regard to confectionery in particular and foods in general. The rules of the State Department of Health practically cover the whole subject of the preparation and sale of foods. Examinations of milk are made monthly and of other foods semi-annually. Adulteration of maple sugar, maple syrup and honey is expressly forbidden. The Sanitary Code of the City of New York is, in effect, a pure food law with special regulations. Misrepresentation of identity, quality, manufacture or weight is penalized as a misdemeanor.

North Carolina.— The Food and Drug Act was approved 25 Feb. 1907, and amended in 1909. It is administered by the State Department of Agriculture. It follows closely the Federal law, and adopts the Federal standards. Special provisions forbid the addition of any habit-forming drug to any liquor except by a druggist upon a physician's prescription. Labels must be truthful, and different labels may not be placed on the same package. Imitation butter may be served at public tables only when notice of such use is given upon conspicuously placed placards, or printed on the bill of fare. Ice-cream which is in any sense an imitation or contains gelatine, gum or eggs must be so labelled, or announcement made by placarding the room where it is served.

North Dakota.— The Pure Food Law was approved 8 March 1907 and is administered by the State Agricultural Experiment Station under rigid sanitary laws. It defines the adulterating and misbranding of foods and beverages, specifying exceptions in the case of candies and chocolates and baking powders. The State law of 1907 affecting dairy products, enforced by a dairy commissioner, is an important feature. The State itself does not furnish its food laws in pamphlet form; they are found in chapters 195 to 198, Laws of 1907, and chapters 188 and 189, Laws of 1909. Federal standards are adopted where the State has not made specific regulations. Foods of quality or strength below the standards are declared misbranded. Any deceit, direct or indirect, in any sale of foods is a misdemeanor. Stale, tainted or spoiled food may not be sold or even stored, and the sale of undrawn poultry is forbidden. No chemical preservative, alum, copper or iron salts, bleaching agents, or fillers may be used in any foods. An exception is made as to benzoate of soda in the case of perishable foods in bulk, where it is necessary to their preservation, and not otherwise; and must not exceed one-twentieth of 1 per cent. The use of "liquid smoke" in preserving meats or fish is forbidden and coal-tar dyes may not be placed in foods. Coated rice and bleached flour may not be sold in the State.

Ohio.— A general food and drugs law is included in the General Code of Ohio, 1910. It is administered by the State dairy and food commissioner; and printed in a book of the laws (1910), and a bulletin of patent and proprietary medicines. Vinegar, wines and liquors, dairy products, veal, candy, feed, maple sugar and syrup, flavoring extracts, canned products and linseed oil have special provisions, in addition to the general laws. Commissioner Dunlap stated in his report of 1908, "Publicity is a great help in the enforcement of the food and drug laws. A small fine is easily paid and soon forgotten, but a public condemnation of a certain brand of foods not only affects present dividends, but is very likely to affect those of the future and, in some cases, drives the dishonest manufacturer entirely out of business."

Oklahoma.— The Food and Drug Law was approved 20 March 1909 and is administered by the State commissioner of health. It is largely a copy of the Federal law. Extended sanitary regulations cover the inspection of premises where food is made, stored or sold and there are special provisions relating to bakeries, sidewalk and floor displays and slaughter-houses. Federal food standards are adopted and bread, confectionery, dairy products, flavoring extracts, flour, lard, preservatives, spices and condiments are specially provided for. The selling and buying of damaged foods is forbidden. The seller of spoiled eggs is personally responsible. Acid drinks may not be kept in or sold from a metallic container which is not enamelled. Artificial coloring matters which are "regarded as harmless" may be used, but consumers are warned that they have not been proved harmless except in very small quantities. The use of imitation or compound foods, or ingredients of foods, in hotels and other public houses must be announced to guests by placards or conspicuously on the bill of fare.

Oregon.— The Pure Food Law of 1910 is administered by the dairy and food commissioner. It embodies most of the provisions of the Federal law. Coated rice may not be sold unless with printed instructions to wash off the coating before cooking it. Tomato catsup may contain benzoate of soda to the amount of one-tenth of 1 per cent, but no other goods may be so treated except upon the decision of the commissioner that it is necessary to preserve them. A «reasonable» variation in weight from that stated on the label is permitted if the specimens examined are as often overweight as underweight. There are special provisions regarding the licensing of fish canners, the duties of the fish warden, the branding of fruit boxes and the inspection of orchards and packing-houses.

Pennsylvania.— The Pure Food Act was approved 13 May 1909. It is modeled after the Federal law, but especially preserves the provisions of the 1897 act relating to milk and cream, the oleomargarine act, the butter, cheese and game laws and the vinegar regulations. It is administered by the dairy and food commissioner with the aid of the factory inspector and the State Livestock Sanitary Board and under its extended rules and regulations. Unwholesome foods and foods with unwholesome additions may not be sold. Otherwise, substitutions and additions to foods are permitted if the quality is not depreciated and the label states the facts. However, no word may be used on the label which is misleading. It is ruled that «Coffee Compound» is misbranding, inasmuch as the added substances are not coffee. Second-hand bottles (except milk and beer bottles) may not be used as food containers. There are separate acts relating to non-alcoholic drinks, ice-cream, fresh eggs, lard, fruit syrup, renovated or process butter and fresh meat, poultry, game and fish. There are also rules and regulations issued by the commissioner relating to other articles of food. The State Department of Agriculture publishes a bulletin containing the food legislation together with a digest of numerous court decisions relating thereto.

Philippine Islands.—Here the United States Food and Drugs Act, 30 June 1906, is adopted *in toto,* excepting that, instead of the United States Secretary of the Treasury, the Secretary of Agriculture and the Secretary of Commerce and Labor making the rules and regulations to carry out the provisions of the act, as in the Federal law, this duty devolves upon the insular collector of customs, the director of health and the collector of internal revenue of the Islands, subject to the approval of the Philippine Secretary of the Interior. All examinations are made by the Philippine Bureau of Science.

Porto Rico.— The Federal Food and Drugs Act is administered by the Insular Board of Health. Adulterations are unlawful only if of unwholesome material or fraudulently labelled.

Rhode Island.— The Pure Food and Drug Act was approved 26 May 1908, and is administered by the Board of Food and Drug Commissioners under an extensive code of definitions and rules. It follows in general the Federal law, and the government standards are adopted. Additions to foods permitted by the Federal law are modified in some cases. The seven coal-tar colors allowed by the government may be used also in Rhode Island, but only if no other colors are used in the same foods. Adulterated or impure spirituous liquors, however labelled, may not be sold, offered for sale nor kept for sale in this State. Possession of such liquors by a dealer is regarded as evidence that he keeps them for sale. A State assayer of liquors has charge of this section of the law. There are also general State laws relating to milk, beef and pork.

South Carolina.— The Food and Drugs Act was approved 20 Feb. 1907. It is administered by the State Board of Health. The definitions contained in the national act are followed in regard to adulteration and misbranding, labelling and guaranty. Bleached flour requires a label «on each sack.» False or misleading statements on labels as to «identity, strength, quality, quantity, or purity,» or place of manufacture are forbidden, but this is held not to apply to advertising. A special act protects the water supply.

South Dakota.— The Pure Food Act was approved 4 March 1909, and amended in 1911. It is administered by the food and drug commissioner. Standards are set for flavoring extracts and other articles. «Floated» oysters may be sold if so labelled. Canned oysters must not have added water unless the number of ounces of oyster «meat» is stated on the label. «Unnecessary water» may not be added to canned fruit and vegetables, unless that fact is plainly stated on the label. The manufacture, sale and shipment of bleached flour is forbidden because (1) by that process it is made to appear of a better grade and (2) injurious nitrites are added. Sulphur dioxide and salts of copper are permitted pending a decision as to their wholesomeness. Compounds of boric acid and sulphites may not be used in meat products. Sausage may contain cereal only if so labelled. Impure ice may not be sold for food purposes and dealers are required to notify customers of such impurity. In view of the fact that nearly all the catsup on sale in the State «has been made in part from decomposed fruit,» the whole State is warned against its sale and consumption in Bulletin 21. The commissioner is required to publish from time to time in all official county papers a list of the foods found to be adulterated or misbranded.

Tennessee.— The Food and Drug Act was approved 9 April 1907, and amended in 1911. The Federal law is followed closely. Standards of dairy products are established by a special act. Saccharine and «liquid smoke» may not be used in foods, cider may not be colored nor have added sugar, and no beverage composed only in part of apple juice may be called or labelled «cider.» Labels are required to tell the exact truth as to the goods under them. Inconspicuous or obscure type and statements on the label is declared a punishable evasion of this law. Where the strength of a food preparation (as vinegar) is not stated it shall be assumed as of standard strength, and goods which fall below the standard are declared misbranded.

Texas.— The Federal law is followed here by the Food and Drugs Act approved 13 March 1911. It is administered by the dairy and food commissioner. The standards of the United

States Department of Agriculture are formally adopted. There are separate rulings relating to alcoholic beverages, baking powder, cider, coffee, confectionery, dairy products, extracts, fish, flour, honey, lard, meat, preserved fruit and vegetables, syrups, spices and condiments, and vinegar. Benzoate of soda may be used only in catsup, sauces, fruit juices and jams, and then only if the percentage is stated on the label. Oxides of sulphur may be used in bleaching, clarifying and refining food products, and phosphoric acid is approved; but no other «chemical substance» may be added to foods.

Utah.— The Food and Drugs Law approved 25 March 1907 is modeled after the Federal law. It is administered by the dairy and food commissioner, with the aid of the State chemist. An extensive code of sanitary regulations is provided. The use of benzoate of soda is restricted to catsups and fruit jellies and preserves, and «such other perishable articles as the State food inspector may determine,» but not in excess of the amount of one-tenth of 1 per cent, and only when stated on the label. Soda fountains serving syrups containing coloring matter or benzoate of soda must display a placard stating such facts. The adulterating of or mixing of intoxicating liquors, or the sale of such liquors at a bar or in bottles, is forbidden unless the container shall be labelled with the exact formula of the adulteration or mixture. No ingredients not normal may be added to spirituous, vinous or malt liquors, not even common salt or sugar.

Vermont.— The Pure Food and Drug Law approved 3 Dec. 1908 and amended in 1909 is to a considerable degree modeled after the Federal law. It is administered by the State Board of Health. Whisky is held to be both food and drug, and no addition may be made to it nor any substance abstracted from it which shall reduce its normal strength or constitution, nor may it be colored to improve its appearance: nor shall any such treated liquor be sold in the State. Untruthful and misleading statements as to foods in advertising have been held not to be an infringement of this law. A complete schedule of food standards, for both animal and vegetable products (the latter including beverages of all kinds), and for salt, and baking powders, is published in pamphlet form with the general law relating to pure food and drugs. Both the law itself and the rules and regulations for its enforcement are original in form and statement, although the effect is similar to that of the Federal act.

Virginia.— The Pure Food Law was approved 14 March 1908. It is modeled after the Federal law. It is administered by the dairy and food commissioner under a sanitary code which was added to in 1911. The retail dealer is protected by a guaranty only when it is given by a resident of the State, and on the goods remaining in original packages. The use of copper salts to «green» vegetables and pickles is permitted «pending further investigation and rulings.» Any food product which «contains naturally a poisonous or deleterious ingredient» is held not to come under the provisions of the law. Sulphite may not be used in preserved meats, and borax only in «very limited quantity» on bacon. Alum may be used in the preparation of pickles if they are afterward well washed, and labelled «Made with alum.» Benzoate may be added to cider, but not to exceed one-tenth of 1 per cent. Ice-cream may contain a «small (designated) amount of gelatine, together with sugar and eggs.» Special regulations are made as to the labelling of baking powders and vinegars. The food standards of the United States Department of Agriculture are adopted, and the schedule together with the sanitary regulations is published by the State Department of Agriculture.

Washington.— The Food and Drugs Act was approved 15 March 1907, and amended 1909. It is administered by the State dairy and food commissioner. In the main it follows the Federal law, but is more rigid. Chemical preservatives may not be used in soft drinks, soda water syrups or fruit syrups, nor in fresh meat, milk or cream. The addition of formaldehyde to milk «or other foods» is made a felony. Whisky may not be sold or offered for sale unless it has been aged at least four years. Mixing, compounding or adding flavorings to «ardent spirits» is forbidden. Specific regulations are in force as to baking powders, honey, lard, molasses, maple syrup and sugar, mustard, pancake flour, buckwheat flour and coffee.

West Virginia.— The Food and Drugs Act of 19 Feb. 1907 is similar to the Federal law in providing against fraudulent and deleterious adulteration, but it has no provisions against misbranding. External preservatives (like liquid smoke) are not forbidden. False or misleading statements on a package or its label determine the food to be adulterated. The sale of unwholesome food is a felony.

Wisconsin.— A dairy and food commissioner publishes the dairy and food laws, and the decisions of the courts relating thereto. They were first enacted in 1898, and were amended and added to in 1907 and 1909. The law of 1909, taking effect 1 Jan. 1910, and prescribing legal definitions and standards for a large number of food products, is one of the most important food laws ever enacted by a State legislature. Coatings, colorings and stainings of articles of food and the bleaching of grain with sulphur, and the sale of such foods and foodstuffs is forbidden. Chemical preservatives may not be used, except benzoate of soda as an external application, and then only when the food to which it is applied may be easily washed clean of it. Specific provisions are made as to canned goods, baking powders, syrup, molasses, glucose mixtures, maple mixtures, sausage mixtures, jelly and jams, dairy products and liquors. There are important chapters also referring to the sanitary production and distribution of food.

Wyoming.— The Food and Drugs Act of 2 March 1911 is administered by the dairy, food and oil commissioner. It is modeled after the Federal law. The food standards of the United States Department of Agriculture are formally adopted and foods not up to those standards are declared adulterated. The making and selling of bleached flour is forbidden. The statement of facts required by law to be placed on the label must be on the principal or «face label.»

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Philippine Islands Statutes No. 1655 (Manila 1910); Scientific Standards for the Government Regulation of Foods (in *Popular Science Monthly*, Vol. 83, pp. 344–354, Lancaster, Pa., 1913). See FOOD, ADULTERATION OF.

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FOODS FOR THE SICK. See SICK, FOODS FOR.

FOOL. See JESTER.

FOOL OF QUALITY, The, a curious novel by Henry Brooke, published originally in five volumes (1760–77). It was considered of such spiritual value by John Wesley, the founder of Methodism, that he prepared a special edition of it for the use of his followers. Toward the close of the book its mysticism becomes exceedingly exalted and visionary, suggesting the author's acquaintance with the teachings of the German mystic, Jacob Boehme.

FOOLS, Feast of. Festivals under this name were regularly celebrated, from the 5th to the 16th century, in several countries of Europe, by the clergy and laity, with the most absurd ceremonies, and form one of the strangest phenomena in the history of mankind. Among the heathen festivals which the Christians could not easily abolish were the Saturnalia, which, in the confusion of all distinctions of ranks, and in extravagance of merriment, exceeded the gayest carnivals. The feast of fools, among Christians, was an imitation of the Saturnalia, and, like this, was celebrated in December. The chief celebration fell upon the day of the Innocents, or upon New Year's Day; but the feast continued from Christmas to the last Sunday of Epiphany. At first only the boys of the choir and young sacristans played the principal part in them; but afterward all the inferior servants of the Church, and even laymen, engaged in them, while the bishop, or the highest clergyman of the place, with the canons, formed the audience. The young people, who played the chief parts, chose from among their own number a bishop or archbishop of fools, or of unreason, as he was called, and consecrated him, with many ridiculous ceremonies, in the chief church of the place. This officer then took the usual seat of the bishop, and caused high mass to be said, unless he preferred to read it himself, and to give his blessing to the people, which was done with the most ridiculous ceremonies. During this time the rest of the performers, dressed in different kinds of masks and disguises, engaged in indecent songs and dances, and practised all possible follies in the church. Except from their association with the Saturnalia nothing is known of the origin of these extravagancies, which appear to have been very ancient. The most celebrated, and probably one of the most ancient, of these festivals was held in the city of Sens, in France. By an ordinance in 1245, intended to abolish it, it is alluded to as a very ancient celebration. So general was the custom of these celebrations in France, that it is said there were few towns at the end of the 17th or even as late as the middle of the 18th century in which associations did not exist. Similar antics seem to have been played in other countries, as Germany, England and Scotland, but it is to be hoped that the height of profanity reached in some of the extant liturgies and rubrics was not commonly attained in these fooleries. The *fête des fous* at Sens was suppressed in 1547. These fêtes were frequently prohibited, but until the Reformation period, when they were considered dangerous by the ecclesiastical authorities, they were commonly tolerated. To account for these celebrations, so opposed to all our ideas of religion, decency and common sense, we must transfer ourselves to times when men combined, with childish simplicity, the most ridiculous with the noblest subjects, and often with less injury than we should suppose to the latter.

FOOL'S ERRAND, A, a story by Albion W. Tourgee, published in 1879. It is the first of a series dealing mainly with events connected with the Civil War. «The Fool» is Comfort Servosse, a Union colonel, who removes from Michigan to a southern plantation after peace is declared. The story of his reception there and the difficulties encountered, arising out of old prejudices upon the one hand and his own training and convictions upon the other, is told with much detail and strong local coloring.

FOOL'S PARSLEY. See DOG PARSLEY.

FOOT. The lower end of the leg that rests on the ground. In the human foot the bony structure is made up of three divisions, the tarsus, metatarsus and phalanges. Seven bones form the tarsus; the os calcis or heelbone, the largest and strongest of all, carries the principal part of the body's weight. On its posterior surface the large muscles of the calf find their attachment through the tendon Achilles. Half in front of the os calcis and superimposed upon it is the next largest bone, the astragalus. This bone bears directly the weight of the body through the large leg-bone, the tibia, resting on the upper surface. On the outer side in front of these two bones is the cuboid, and on the inner side the scaphoid or navicular bone. In front of the scaphoid there are the three small cuneiform bones, internal, middle and external. These three bones with the cuboid form articulations with the next row or division. The metatarsus is formed of five so-called long bones; that is, each bone has a shaft and articulating extremities. To each of these is joined one of the next division or phalanges. These are also long bones, the great toe made up of two bones, and the others of three each. Strong ligaments bind these bones to one another in such a way as to form and maintain an arch extending forward and backward, and somewhat from side to side, the points of contact with the ground being only with the os calcis behind and the metatarsus and phalanges in front — the so-called ball of the foot. By this arrangement shock is transmitted through an arch or spring, pads at these two points also further eliminating jars. The sole of the foot is also covered with small muscles, which move the toes, and tendons that flex the toes and extend the foot on the ankle. Across the dorsum or instep pass the flattened tendons that flex the foot and extend the toes. The chief artery to the sole comes down on the inner side of the heel, passing across to the outer side, then arching across to the inner side again, giving off branches to the toes. On the dorsum the main artery comes to the surface at the instep and forms an arch of supply to the toes. The nerves on both surfaces closely follow the arteries.

Among the lower animals, monkeys have feet that approach nearest to those of the human. The separation of the great toe, in a way corresponding to the thumb, and the absence of the arch are the points of difference. In many of the animals, as in the cat tribe, there is a greater or less tendency toward a rudimentary inner toe, and an increase of the function of the ball of the foot, with a lessening of the importance of the heel. In the cattle and equines the toes are fewer, and the nails or claws become converted into hoofs. The horse walks on the end of his single digit.

In measure of length, the foot is derived from the assumed length of the human foot, containing 12 linear inches. A square foot is a square whose side is one foot, and is therefore equal to 144 square inches. A cubic foot is a cube whose side is one foot, and the cube contains 1,728 cubic inches. The foot is a common measure in various countries, but its dimensions vary somewhat. *In poetry,* a measure consisting of a variety of syllables, two, three or four, in combinations of long and short, or accented and unaccented syllables. The number of possible varieties of feet is reckoned at 28. (See RHYTHM). *In mechanics* and popular usage, the lower part of a thing, especially the lower end of a leg, as of a table, desk, etc.

FOOT AND MOUTH DISEASE. See MURRAIN.

FOOT-POUND, the unit of work or of energy that is commonly used in engineering calculations in England and the United States. It is defined as the quantity of work expended in raising a weight of one pound through a vertical distance of one foot. As the attraction of the earth for a pound of matter varies somewhat in different latitudes and at different heights above the sea, the foot-pound is subject to coresponding variations as we pass from one locality to another. To give the unit greater definiteness it has been proposed to define it as the quantity of work done in raising one pound of matter through a vertical distance of one foot, at the level of the sea in latitude 45°. This definition differs from the ordinary one, it will be observed, solely by specifying the locality at which the experiment is supposed to be performed. See UNITS OF MEASUREMENT.

FOOT-ROT, a disease in the feet of sheep, the more common form of which is an inordinate growth of hoof, which at the toe, or round the margin, becomes turned down, cracked or torn, thus affording lodgment for sand and dirt. In the second form of the disease the foot becomes hot, tender and swollen, with ulcerations between the toes, followed by the sprouting of proud flesh. The inflammation is due to suppression of the secretion of the gland between the toes, usually the result of standing too much in wet ground. The best remedy is to pare away the diseased and ragged parts of the hoof, thoroughly applying a lotion made by dissolving one pound of blue vitriol in a quart of water, and keeping the animal always in a dry place.

FOOT-WALL. In mining language, the foot-wall of a vein is the rock boundary of its lower side, the side on which a miner would stand in breaking down the ore. The term is also used in speaking of a fault or rock dislocation, the foot-wall of a fault being formed by the edges of the rock strata that underlie the plane of displacement. See FAULT; MINES AND MINING; ORE DEPOSIT.

FOOT WASHING, a religious ceremony which was very general in the early Christian Church and still survives in the Roman Catholic denomination. It arose in the desire to emulate the example and humility of Christ who at the Last Supper laved the feet of His disciples. It came to be observed generally on Maundy Thursday of Holy Week, was practised by the popes during the Middle Ages and also by Catholic monarchs. At present nearly all Catholic bishops perform the ceremony and it is also observed by the emperor of Austria and the king of Spain. Among the Reformers, it was retained only by the Anabaptists, Moravians, members of the Church of the Brethern (Dunkers), Sandemanians and a few minor sects. In the Russian Church it is observed during Easter week by the pilgrims to Jerusalem.

FOOTA-JALLON. See FUTA-JALLON.

FOOTBALL IN AMERICA, as in England, is of different varieties, but by far the most prominent is the game played in the colleges. This type is the outgrowth of the English Rugby and still possesses points of similarity to the game from which it was derived. Association football is played in and around some of the mill towns where the foreign population predominates, and previous to 1870 a mongrel kind of football made up of a combination of Association and Rugby had some vogue, and was the original form of the sport in America.

The type, however, known as American football suggests now only one variety and that is the one mentioned above as prevailing in colleges and universities. This sport draws to each of its chief annual contests from 25,000 to 40,000 spectators. During its season, which consists of October and November, it temporarily eclipses all other athletics in interest. For this reason it is the money maker in college athletics, in a great number of universities the receipts from the football contests practically supporting the other athletic branches throughout the year.

This sport, developed as it now stands, was originally introduced into American colleges by Harvard, whose team, having visited Canada and played under the Canadian rules, became enamored of the style of the English Rugby, and, although in 1875, as a matter of consideration for her ancient rival, Yale, Harvard agreed to compromise between what was then known as American football and English Rugby, in the next year, 1876, both teams adopted the Rugby Union rules as they stood at that day. Unfortunately for the peace of mind of the legislators, but probably fortunately in another way, in that the final result was the development of still another distinct type of football, there were no traditions in America regarding the English Rugby code and what was forbidden by letter was accepted as barred, whereas anything that was not thus distinctly prohibited the American player thought was perfectly legitimate. Contentions arose over the interpretation of the rules and these discussions led to conventions, and, in the settlement of the problems arising, the rules rapidly multiplied, until in a few years there were more than twice the original number. While this was happening, some of the old English rules apparently became dead letters and were, therefore, dropped. When captains and players attended any of these conventions it was only human that they should contend for possible advantages for their own teams rather than for the improvement of the game as a sport and this led to the appointment of an advisory committee of graduates. In their hands was placed the matter of rules to this extent, that yearly they met and recommended changes which were then submitted to an intercollegiate association for discussion and usually for approval. This lasted as long as there was an intercollegiate association or league of colleges indulging in football. This league finally dissolved and for the season following there were two codes of rules in existence adopted by two different sets of universities. This was wholly unsatisfactory and led to the intervention of the University Athletic Club of New York. This club selected football enthusiasts and asked from them a recommendation as to a code of rules. These gentlemen met and framed such a code, which was then adopted by the various colleges throughout the country. This method of procedure lasted for several years, even after the dissolution of the University Athletic Club, and it is from this body that the football rules emanated, until at the end of the season of 1905 a general conference of colleges not represented upon the Rules Committee appointed seven delegates with whom the old committee amalgamated, forming a new committee of 14. This committee made the rules for 1906 and introduced what was known as the 10-yard rule, which practically did away with the old mass plays that had caused the game to become too contracted.

As for a brief description of the game and the way in which it is played, the following gives the main points:

The game is played on a field rectangular in shape, 160 feet wide and 330 feet long. The outline of this field is made by heavy white lines marked, as are the lines in a tennis court, with lime. This field is also traversed by transverse lines five yards apart marked for the convenience of the referee in judging the distance gained or lost by either side. In addition to these transverse lines the field is marked by longitudinal lines also five yards apart in order to assist the referee once more in measuring distance rapidly with his eye. This latter marking was rendered necessary by a rule providing that within that section of the field the quarterback may run with the ball providing he goes a certain distance out, that is, toward the side line, from the man who puts the ball in play in the centre. This same five yard distance governs a forward pass. The lines which mark the ends of the field are called goal lines, and in the middle of each is a goal made by erecting two posts 18 feet 6 inches apart with a cross bar 10 feet from the ground. The ball is a prolate spheroid in shape consisting of a rubber bladder in a leather cover.

The game is played by 11 men on a side, these 11 men being called a team. For the purpose of general distinction, although different formations are possible, the seven men who play in the forward line, that is on a line with the ball when it is put in play, are called the rushers, the men behind them the backs. The distinguishing terms for the men in the line are of interest. First there is the centre rusher, or centre, or snap-back, which term designates the man who stands in the middle of the line and usually puts the ball in play in a scrimmage. The men on his right and left are called guards, the men next beyond them toward the ends are called tackles, and the two men on the ends of the line are called the ends. The man close behind the centre rusher is called the quarter-back. The two men some feet behind him are called the half-backs and the fourth man behind the line is called the full-back. In executing various plays the men take up different positions on the field, but they are usually distinguished by their positions as above.

The game is started by placing the ball in the middle of the field and a man of the side in possession must then kick it at least 10 yards into the territory of the opponents, his own men being behind him when he kicks the ball and the opponents standing at least 10 yards back from the middle line of the field. The choice of goals and the possession of the ball having been determined by the toss of a coin, the side winning has the privilege of thus either kicking off or selecting either goal. When the ball is once kicked off any man who is on side, that is, between the ball and his own goal, may secure it and run with it and when he is thus running may be tackled by his opponents and brought to a stop. If he is thus tackled and stopped he calls "down" and the ball is placed on that spot for a scrimmage. When the ball is thus down the two teams line up opposite each other, the side with the ball endeavoring to protect its men so that one of the backs may be able to secure the ball and make a run with it, kick it, or pass it, while members of the opposing side are endeavoring to break through and stop this. The men of the side which has the ball in its possession may not use their hands or arms to obstruct their opponents, but may do this with the body only. The players of the side not in possession of the ball on the other hand are privileged to use their hands and arms to break through the ranks of their opponents. The man who has the ball in his possession, that is running with it, may use his hands and arms to ward off the opponents, but the rest of his side may not. The play thus continues by a succession of downs and runs interspersed with kicks, for a side may kick or pass the ball under certain limitations instead of running with it if they so desire.

In order to prevent a side holding the ball indefinitely without making progress there is a rule providing that in three attempts the side must advance the ball 10 yards or surrender it to the opponents. For this reason it is quite customary after two attempts, if the desired ground has not been gained, for the side in possession to kick the ball, thus transferring it to the possession of their opponents as far into the opponents' territory as possible. One forward pass is allowed to a scrimmage under certain restrictions, and a kicked ball striking the ground puts all the players of the kicker's side «on side,» otherwise a man who gets ahead of the ball when last touched by one of his own side behind him may not touch the ball. When the ball goes across the side line it is out of bounds and if it has gone out of bounds through being kicked, it belongs to the opponents, but if a man carries it out of bounds, in his possession, his own side has the right to it. The ball is brought back to the spot where it crossed the line and is put in play by the holder walking in a certain distance and putting it on the ground for a scrimmage as already described.

The game thus proceeds until the ball approaches one or the other goal line and here begins the question of generalship for scoring. If the ball be kicked by a drop kick over the cross bar of the opponent's goal it counts the side thus kicking it four points. If the ball be carried by the player of that side across his opponent's goal line or secured by him after it has been kicked across it scores a touch-down, which counts five points and also entitles the side making it to a try at goal. This is performed either by kicking the ball out to a player who catches it and makes a mark with his heel, the ball then being kicked from any point behind that mark, or being brought directly out by a player of the side which has touched it down and held on the ground for another of his side to kick. In either event if the touch-down be converted into a goal by the kicking of the ball over the cross bar it adds an additional point for this scoring.

There is one other possible means of scoring and that is when a side is pressed by the opponents, and, instead of the opponents securing the ball, the defenders of the side secure it and either kick, pass or carry it across their own goal-line and touch it back behind their own goal. This entitles them to carry the ball out 25 yards for a kick. The opponents stand on the 25-yard line while this kick is made. This safety, however, as it is called, counts two points against the side making it.

The game is divided into two halves of 35 minutes each with a 10-minute intermission, and the side which has scored the greater number of points at the end of the full period of play wins the game.

American football, while it started from the English Rugby Union rules, has developed in many directions so that the game would not now be recognizable to an Englishman. The one thing that he would see that possibly reminded him of Rugby would be that occasionally a man runs in the open field with the ball. But the various formations and the tactics adopted would puzzle him exceedingly. Like the Rugby Union, however, there is some kicking in it, but far less than in the English Association. In the English scrimmage the two lines of forwards push until the ball pops out somewhere, whereas in the American scrimmage the man in the centre who has possession of the ball snaps it out with his hand whenever he is ready to do so to the quarter-back who stands directly behind him and this man passes it to some other player of his own side. This enables the Americans to carry out their very elaborate system of plays because the ball can be absolutely directed at any time to any spot. So perfect has this development become that the quarter-back gives signals for the plays by means of which signals the entire team knows exactly what man is to receive the ball and where he is to run with it when he has received it. Thus the others may assist him very materially in making his gain. Some idea of the variety of plays can be gathered from the fact that teams can without difficulty execute no less than 40 to 50 plays, each distinct from the other. It is not difficult to imagine that with this highly developed form of attack a most thorough and well-studied plan of defense is equally necessary. It is also not difficult to understand that this development on both sides has brought about specialization in the work of various players so that almost every position on the field has a distinct line of duties which its incumbent must be able to perform with skill and accuracy. The signals are quite elaborate codes, devised for easy memorizing, but at the same time sufficiently intricate and bewildering as to render the liability of discovery by the opponents very small.

In the American game the quarter-back usually gives these signals, although the captain sometimes prefers to give them himself.

The history of the game in America as in England and elsewhere has been one of discussion and opposition, the latter coming from those who believe that the sport is too strenuous. Kingly edicts were issued in the old days in England and in the United States State legislatures have been asked at various times to forbid the pastime. Yet it has lived on. In America the game has had already three great epochs as it were. The first in the 80's when the «block game» was legislated out of existence, then in the early 90's when «momentum mass» plays were excised and finally in 1906 when the 10-yard rule was adopted.

A widespread public sentiment was advanced in favor of such a change in the rules as might bring about more «open play,» and it was further felt by the committee and their advisers that the rules should be so modified and the powers of the officials so increased as to eliminate to the greatest possible extent unsportsmanlike tactics, and with these ends in view the committee decided upon the incorporation of two important changes. The first of these was the adoption of the 10-yard rule together with the forward pass and on side kick. The second general change was the incorporation of rules that in some cases greatly increased the penalty for unfair tactics, and in others did away with all excuses for indulgence in certain rough plays, at the same time providing for more efficient work by officials. To make sure that the wishes of the committee were carried out in this matter, the duties of the linesman were enlarged and he was made practically an assistant to the umpire and given absolute power to deal with certain classes of fouls. A second umpire was added. The American game thus has for its conduct four officials, the referee, whose duties are principally related to the progress of the ball, the umpires who have charge as it were of the conduct of the players, the linesman who acts as an added umpire, at the same time assisting the referee in the matter of measurements and time keeping.

WALTER CAMP,
Yale University.

FOOTE, Allen Ripley, American economist: b. Olcott, N. Y., 1842. He received a common school education and served with the Union forces in the Civil War. From 1899 to 1905 he edited *Public Policy* and in 1907 was made president of the National Tax Association. Two years later he became president of the Ohio State Board of Commerce. He published ‘Economic Value of Electric Light and Power’ (1899); ‘Municipal Public Service Industries’ (1899); ‘Constitutional Municipal Government’ (1900); ‘Public Policy Editorials’ (3 vols., 1901–03); ‘Employers and Employees’ (1902); ‘Labor, Capital and the Public’ (1905); ‘Regulation of Public Utilities’ (1911); ‘Compensation for Industrial Injuries’ (1913).

FOOTE, Andrew Hull, American naval officer: b. New Haven, Conn., 12 Sept. 1806; d. 26 June 1863. He entered the navy as a midshipman in 1822, and in 1849–52 he was engaged in the suppression of the slave trade on the coast of Africa. In command of the China station in 1856, when the Chinese and English were at war, he exerted himself to protect American property, and was fired upon by the Celestials. His demand for an apology was refused and he stormed and captured four Chinese forts. Previous to the War of Secession he was commandant at the Brooklyn Navy Yard. In 1861 he commanded the expedition against Fort Henry and Fort Donelson (q.v.) on the Tennessee and Cumberland rivers, and directed the attack on Island Number 10. In 1862 he was promoted rear-admiral. He wrote ‘Africa and the American Flag’ (1854). He was appointed commander of the fleet at Charleston to succeed Admiral Dupont, but died before occupying the command.

FOOTE, Arthur, American composer: b. Salem, Mass., 5 March 1853. He was graduated at Harvard 1874, became a teacher of the piano, and was organist of the First Church in Boston 1878–1910. He has devoted much time to composition, in which field he has been very successful, having published a cantata ‘Hiawatha,’ a trio in C major for piano, violin and ’cello; suites for the orchestra; an overture, ‘In the Mountains’; songs and pianoforte pieces. His work has been rather more along classical lines than in the romantic school, but a tendency toward the latter has shown itself in his later compositions. He is a member of the American Academy of Arts and Sciences.

FOOTE, Henry Stuart, American statesman: b. Fauquier County, Va., 20 Sept. 1800; d. Nashville, Tenn., 20 May 1880. He was admitted to the bar in 1822; removed to Mississippi in 1826 and entered politics. In 1847 he was elected to the United States Senate, and in 1852 was elected governor of the State. He was a strong opponent of secession at the convention held in Knoxville, Tenn., in 1859, but when secession was an assured fact, he accepted an election to the Confederate Congress, where he opposed most of President Davis’ measures. He evidently sympathized strongly with the North, for immediately on the close of hostilities he located in Washington to practice law. He became an active supporter of President Grant, and his policy of reconstruction, and was rewarded with the post of director of the United States Mint at New Orleans. He wrote several books of reminiscences, including a ‘History of the Civil War’ (1867).

FOOTE, Mary (HALLOCK), American novelist: b. Milton, N. Y., 19 Nov. 1847. She studied art in New York, and in 1876 she was married to Arthur D. Foote, a mining engineer. Since her marriage she lived in California, Colorado and Idaho, which have furnished themes for her novels and drawings. She also furnished elaborate illustrations for Longfellow’s ‘Skeleton in Armor’ and ‘The Hanging of the Crane.’ She has published ‘The Led Horse Claim’ (1883); ‘John Bodewin’s Testimony’ (1886); ‘The Last Assembly Ball’ (1889); ‘In Exile and Other Stories’ (1894); ‘The Chosen Valley’; ‘Cœur d’ Alène’ (1894); ‘The Cup of Trembling and Other Stories’ (1895); ‘The Little Fig Tree Stories’ (1900); ‘The Prodigal’ (1900); ‘The Desert and the Sown’ (1902); ‘A Touch of Sun and Other Stories’ (1903); ‘The Royal Americans (1910); ‘Picked Company’ (1912); ‘The Valley Road’ (1915); etc.

FOOTE, Samuel Augustus, American statesman; b. Cheshire, Conn., 8 Nov. 1780; d. there, 15 Sept. 1846. He was graduated at Yale College in 1797; served in the legislature for many years; was member of Congress in 1819–21 and 1823–25; served one term in the United States Senate; was governor of Connecticut, and one of the presidential electors on the Clay and Frelinghuysen ticket in 1844. It was he who in 1821 introduced the bill «on the public lands» that occasioned the memorable debate between Daniel Webster and Senator Hayne of South Carolina.

FOOTMEN, a collector’s name for the small gray and yellowish moths of the family *Lithostidæ,* which have simple antennæ, rather narrow fore wings, beneath which the broad hind wings are folded when at rest.

FOOTSCRAY, foots’krā, Australia, city of Bourke County, Victoria, on Saltwater River, four miles west of Melbourne. It has large bluestone quarries from which much of the building stone of Melbourne and vicinity is obtained. It is also the seat of important manufactures, including sugar mills, soap works, jute factories, foundries, woolen mills, chemical works, etc. Pop. 23,643.

FOPPA, fŏp’pa, **Vincenzo,** Italian painter: b. Brescia, about 1427; d. 1515. We know very little of his early life, but about 1456 he settled in Pavia, where he was employed by the Sforzas and became the leader of the Lombard school of painting. He returned to Brescia in 1489. He enjoyed a wide popularity in his lifetime. His most noted works are a fresco in the Brera Gallery, Milan, ‘Martyrdom of Saint Sebastian,’ and a ‘Crucifixion’ in Bergamo. At least two of his Madonnas are owned in America, one by Theodore Davis of Newport, R. I., and another by J. G. Johnson of Philadelphia, Pa. Consult Ffoulkes, C. J., and Maiocchi, R., ‘Vincenzo Foppa’ (London 1910) and Berenson, ‘North Italian Painters of the Renaissance’ (ib. 1907).

FORAGE, in agriculture. See Stock-feeding.

FORAGE, in military parlance, the food issued by the commissariat for animals. Consult ‘Field Service Regulations, United States Army’ (Washington 1914).

FORAGING ANTS, the large, powerful ants of the tropical American genus *Eciton,* which from time to time march in hosts across the country, with the precision of an army under the control of officers. These marching columns are composed almost wholly of workers, apparently directed by a larger, lighter-colored kind; and they search every inch of ground, rubbish-heap or thicket, hunting for what they can eat and driving every living thing out of their way in terror. Several species exist, differing in various respects. One, for example, devotes its forays entirely to finding and robbing the homes of a smaller and very different ant (*Hypoclinea*), whose larvæ and pupæ it carries off, but lets the adults go free. Ordinarily no insect that can be caught is spared. These ants have no settled abode, but make nests in hollow stumps, or underground, and change them each season or oftener. Their colonies exhibit a high degree of organization, and contain five separate castes, instead of the three of ordinary ants. (See Ants). Consult Belt, ‘Naturalist in Nicaragua’ (1888).

FORAIN, fō'răṅ', **Jean Louis,** French caricaturist and etcher: b. Rheims 1852. He studied at the École des Beaux-Arts, but was in great measure self-taught. He has been eminently successful in his delineation of the social and political life of Paris. In 1876 appeared his first drawing in *La Cravache,* after which his work appeared in *Le Figaro, Le Rire, La Courrier Français,* and other journals. In 1898 he was one of the founders of the anti-Semitic periodical *Psst.* The best collection of his works is that in the Dresden Print Room. Among his drawings in album form are ‘La comédie parisienne’ (1892); ‘Les temps difficiles’ (1893); ‘Doux pays’ (1897). Consult Guérin, ‘Forain, Lithographe’ (Paris 1910); Singer, ‘Lithographs and Etchings by Forain’ (in *International Studio,* New York 1909).

FORAKER, Joseph Benson, American statesman: b. on farm near Rainsboro, Highland County, Ohio, 5 July 1846; d. Cincinnati, 10 May 1917. He pursued his education on through various Ohio institutions and in 1862 enlisted as a private in A company, Eighty-ninth Regiment, Ohio Volunteer Infantry, and served until the close of the Civil War, when he was mustered out with the rank of first lieutenant and brevet captain. After the war he was graduated in 1869 from Cornell University, and began the practice of law in Cincinnati. In 1882 he was elected judge of the Superior Court at Cincinnati and in 1883 was nominated on the Republican ticket for governor of Ohio. He was defeated by former Governor Bishop, but two years later, with the backing of John Sherman, then United States Senator from Ohio, he was elected and was re-elected in 1887. He accepted the nomination for a third term in 1889 and went down to defeat in the great landslide against his party in that year. He resumed his practice of law in Cincinnati but was considered at all times a political factor. In 1897 he became United States Senator from Ohio, succeeding Calvin S. Bryce. He was chairman of the Ohio Republican State Conventions in 1886, 1890, 1896 and 1900, was a delegate at large from Ohio to the national Republican conventions of 1884, 1888, 1892, 1896, 1900 and 1904, and in the 1884 and 1888 conventions presented the name of John Sherman for the nomination for the Presidency. He also presented the name of William McKinley for the Presidency in 1896 and 1900. His last term as United States Senator expired 4 March 1909. He supported McKinley but friction developed between himself and Roosevelt, many of whose measures he opposed. The only active part taken in politics by Senator Foraker after his retirement from public life was his candidacy for the Republican nomination for United States Senator in 1914, in an effort to clear himself of charges based on the testimony of Colonel Mulhall before an investigation committee of the Senate. He was defeated by Senator Warren G. Harding. Senator Foraker after his retirement from the Senate devoted most of his time to the practice of law.

FORAMINIFERA, an order of animals in the phylum *Protozoa* and the class *Rhizopoda.* The body is contained within a calcareous test or shell, which is many chambered. It may be cylindrical or spiral, or it may tend to the pyramidal form. The outer surface presents a punctate or dotted appearance, produced by the presence of very numerous small apertures, or "foramina." The chambers in some are perfectly distinct from others, though so aggregated as to form a compound shell; in others they are connected with a funnel-like tube. The texture of the shell in one group is porcelain-like, in another glassy. The inside of the shell has an extensile and contractile sarcode (protoplasm) of a reddish or yellow color, which streams through the openings and thinly covers the outside. Foraminifers are always of small size, and often microscopic. With the exception of *Gromia* and one or two related genera which occur both in fresh and salt water, they are exclusively marine and many dwell only in the abysses. Sometimes their shells constitute sea-sand. In the Atlantic, at a depth of 3,000 fathoms, there is an ooze composed almost entirely of *Globigerinæ* which belong to this order. See Globigerina.

The exceedingly antique *Eozoon* (q.v.) of the Laurentian rocks, if organic, as is generally believed, was apparently a foraminifer. Forms more unequivocal, some of them very like recent species, occur in the Silurian, the Carboniferous, and other strata. They are found through all the Secondary Period, chalk (q.v.) being almost entirely composed of their cases. They increase in number and importance in the Tertiary. The flat, coin-shaped nummulites of the Middle Eocene form the principal bulk of great series of limestone rocks that furnish excellent building-stone. The type of the order has remained wonderfully constant from the earliest times till now.

FORBACH, fôr'bäcʜ, Lorraine, town situated at the foot of the Schlossberg, on a tributary of the Rossel, five miles southwest of Saarbrücken. It has manufactures of glass, pasteboard and soap. In August 1870, the German troops occupied the town after the battle of Spichern on the 6th. Pop. 10,107.

FORBES, fôrbz, **Archibald,** English journalist and war correspondent: b. Morayshire 1838; d. London, 30 March 1900. From 1857 till 1867 he served in the Royal Dragoons, but abandoning the army for journalism, joined the staff of the *Daily News* as war correspondent. In this capacity he accompanied the German army through the war of 1870–71, and was present in Paris at the downfall of the Commune. Was in India during the 1874 famine, and shortly afterward the Carlist and other troubles kept him for a time in Spain. He accompanied the Prince of Wales on his Indian tour in 1875–76, and on returning described as an eye-witness the Servian war of 1876. In the following year he was with the Russians in their campaign against the Turks, being present at the siege of Plevna, and in 1878 he went to Cyprus. He was under fire during the Afghanistan campaign of 1878–79, next visited Mandalay, and then went to Zululand. He afterward devoted himself mainly to lecturing at home and in America and Australia. His chief publications are 'My Experiences in the Franco-German War' (1872); 'Glimpses through the Cannon Smoke' (1880); 'Chinese Gordon' (1884); 'Souvenirs of Some Continents' (1885); 'William I of Germany' (1888); 'Barracks, Bivouacs and Battles' (1891); 'Havelock' (1891); 'Afghan Wars' (1892); 'Colin Campbell, Lord Clyde' (1895); 'Camps, Quarters and Casual Places' (1896); 'Memories and Studies of War and Peace' (1896); 'The Black Watch' (1896); 'Battles of the Nineteenth Century' (1896); 'Life of Napoleon III' (1898).

FORBES, David, English geologist: b. Douglas, Isle of Man, 6 Sept. 1828; d. London 5 Dec. 1876. As a civil engineer he traveled all over the world, studying rock formations and fossils, and writing 'On the Relations of the Silurian and Metamorphic Rocks of the South of Norway' (1855); 'On the Geology of Bolivia and Southern Peru' (1861); and kindred treatises.

FORBES, Duncan, Scottish jurist: b. near Inverness, Scotland, 10 Nov. 1685; d. 10 Dec. 1747. He studied at Paris, Utrecht and Edinburgh, and rose, in 1737, to the rank of president of the Court of Sessions. It was mainly owing to his exertions that the rebellion of 1745 was prevented from spreading more widely among the clans; but so ungratefully was he treated by the government that he was never able to obtain repayment of the various sums he had expended to uphold it. He was the author of: 'Thoughts on Religion'; the 'Culloden Papers'; etc.

FORBES, Edward, English naturalist: b. Douglas, Isle of Man, 12 Feb. 1815; d. Wardie, near Edinburgh, 18 Nov. 1854. He was a brother of David Forbes (q.v.). He became professor of botany in King's College, London, in 1842, and curator of the Geological Society; in 1851 professor of natural history in the School of Mines; and in 1854 he was elected to the chair of natural history in the University of Edinburgh. He did much to advance and systematize special departments of natural history, both by his own labors and by the stimulus which he imparted to his associates and pupils. His classification of the British starfishes opened a new era in that branch of zoology; and his discovery that air-breathing mollluscs lived at the period of the Purbeck beds rectified many erroneous hypotheses. Of his separate works, papers and monographs upward of 200 were published; among them, 'Starfishes' (1841); 'The Mollusca and Radiata of the Ægean' (1843); 'Travels in Lycia' (1846); 'Naked-eyed Medusæ' (1847); 'British Mollusca' (1848–52); 'Literary Papers' (1855).

FORBES, Edwin, American landscape and genre painter: b. New York 1839; d. Flatbush, L. I., 1895. He was a pupil of A. F. Tait and became special artist for 'Frank Leslie's Magazine' during the Civil War. The drawings which he made during that time are now in the war office at Washington and are of historic value.

FORBES, George, English electrical engineer: b. 1849. He received his education at the universities of St. Andrews and Cambridge, was formerly professor of natural philosophy at Anderson's College, Glasgow. He was electrical engineer for the power works at Niagara Falls. He published 'The Transit of Venus' (1874); 'The Theory of the Glaciers of Savoy' (1874); 'Lectures on Electricity' (1888); 'Alternating and Interrupted Electric Current' (1895); 'Elektrische Wechselströme und Unterbochene Ströme' (1896); 'History of Astronomy' (1909); 'Puppets: A Work-a-Day Philosophy' (1911); 'David Gill, Man and Astronomer' (1916).

FORBES, Harriette Merrifield, American writer: b. Worcester, Mass., 22 Oct. 1856. She was married to W. T. Forbes 5 Feb. 1884. She has published 'The Hundredth Town' (1889); 'The Dairy of Rev. Ebenezer Parkman' (1899).

FORBES, Henry Ogg, Scottish explorer: b. Drumblade, 30 Jan. 1851. He was educated at Aberdeen and Edinburgh universities. He traveled in Portugal in 1875–77, making biological and geological investigations; was engaged in exploration in Keeling Islands, Java, Sumatra, Banda, Burn, Timor, where he made large collections and numerous observations on ethnology, biology and geography of these islands in 1878–84. In 1885–86 he led an expedition to explore Mount Owen Stanley, New Guinea; from 1886 to 1889 was acting deputy commissioner of British New Guinea and in the latter year led a second expedition to Mount Owen Stanley. From 1890 to 1893 he was director of the Canterbury Museum, New Zealand. He was British association lecturer to operative classes at Toronto in 1897 and explored the island of Socotra in 1898–99. From 1894 to 1911 he was director of museums to the Corporation of Liverpool, in 1911–13 was commissioned by the government of Peru to report upon the birds of the Guano Islands. He published 'A Naturalist's Wanderings in the Eastern Archipelago'; 'Handbook to Primates'; 'British Birds' Eggs and Nests,' with Mrs. Forbes. He is editor and part author of 'Natural History of Socotra and Abd-el-Kuri' (1903).

FORBES, James David, Scottish physicist: b. Colinton, near Edinburgh, 20 April 1809; d. Clifton, England, 31 Dec. 1868. In 1833 he was appointed to the chair of natural philosophy in the University of Edinburgh and in 1859 became principal of the University of Saint Andrews. His fame rests chiefly on his study of glaciers. His chief publications on this subject are ‘Travels Through the Alps of Savoy’ (1843); ‘Norway and its Glaciers’ (1853); ‘Tour of Mont Blanc and Monte Rosa’ (1855); and ‘Occasional Papers on the Theory of Glaciers’ (1859). Forbes’ theory was that glacier ice moves in its channel like a viscous fluid, the middle moving faster than the sides, and the upper portions faster than the lower. His ‘Life and Letters’ was published in 1873.

FORBES, John Colin, Canadian artist: b. Toronto, Canada, 3 Jan. 1846. He studied at the Royal Academy, London, England, and on the continent, and returning to Canada he became a successful landscape and portrait painter. Among his works are ‘Foundering of the Hibernia’; ‘The Mount of the Holy Cross’; ‘The Glacier of the Selkirk’; ‘The Lily’; and portraits of King Edward VII and Queen Alexandra, Gladstone, Sir H. Campbell-Bannermann, Sir John A. Macdonald and the Marquis of Dufferin.

FORBES, Stanhope Alexander, English artist: b. Dublin, Ireland, 18 Nov. 1857. He studied art at the Royal Academy Schools, and under Bonnat in Paris, and was elected a member of the Royal Academy in 1910. Among his pictures exhibited at the Royal Academy are ‘The Fish Sale’; ‘The Health of the Bride’; ‘By Order of the Court’; ‘The Salvation Army’; ‘Forging the Anchor’; ‘The Lighthouse’; ‘The Smithy’; ‘Christmas Eve.’

FORBES, Stephen Alfred, American entomologist: b. Silver Creek, Ill., 29 May 1844. He received his education at the Illinois State Normal University and the University of Indiana. For five years he was curator of the Museum of the Illinois Natural History Society. In 1877 he founded and became director of the State Laboratory of Natural History. In 1882 he was appointed State entomologist and in 1894 became head of the Illinois Biological Station. In 1884 began his long connection with the University of Illinois, successively as professor of zoology and professor of entomology. From 1888 to 1895 he was dean of the college of science. At the Chicago World’s Fair of 1893 he organized the International Congress of Zoologists. His writings are confined to sundry entomological reports.

FORBES, W(illiam) Cameron, American public official: b. Milton, Mass., 1870. In 1892 he was graduated at Harvard University; spent some time in Boston as employee of a banking firm. In 1897–1902 he was chief of the finance department of Stone and Webster, engineers, and in 1899 became a partner of the banking house of J. M. Forbes & Co. of Boston. From 1904 to 1908 he was member of the Philippine Commission, was made vice-governor in 1908 and served as governor-general from 1909 to 1913 under the Taft administration.

FORBES-ROBERTSON, Sir **Johnston,** English actor: b. London, 16 Jan. 1853. He is the son of John Forbes-Robertson, was educated at Charterhouse, studied art at the Royal Academy Schools, and at the age of 21 took up acting as his profession. He was at various times associated with the Bancrofts, Sir John Hare, Sir Henry Irving and Mrs. Patrick Campbell. In 1895 he first organized a London season, and began a series of Shakespearian revivals that definitely established his fame, his rendering of the part of Hamlet being regarded as the finest on the stage. Other successes achieved by him were in ‘The Light That Failed’ and ‘The Passing of the Third Floor Back’—the latter running two entire seasons. He made his first visit to the United States in 1885, and included that country in his farewell tour,—undertaken while in the plenitude of his powers—in the season of 1913–14. He was knighted in 1914. His wife, Gertrude Elliott, an American actress, was an admirable support to her distinguished husband, playing with him in all the leading parts.

FORBONNAIS, fôr'bō-nā, **François Véron Duverger de,** French economist: b. Le Mans Sarthe 1722; d. 1800. He studied commerce and trade methods at Nantes, traveled in Italy and Spain, and in 1756 was appointed inspector-general of the mint. Three years later he was made chief of the office of the Comptroller-General of Finance but was retired in 1763. In 1794 he was made a member of the Institut de France. His advice was often sought by the Revolutionary rulers of France especially in regard to financial matters. He was a contributor to the ‘Encyclopédie’ and wrote several works on economics, which are still of value. These include ‘Eléments du commerce’ (2 vols., 1754); ‘Recherches et considérations sur les finances de France depuis 1595 jusqu'en 1721’ (1758); ‘Principes et observations économiques’ (1767); ‘Analyse des principes sur la circulation des denrées’ (1800). Consult de Sales, Delisle, ‘Vie littéraire de Forbonnais’ (Paris 1801).

FORCADOS, fôr-käd'dōs, Nigeria, town and port of call situated on the delta of the Niger on land which has been reclaimed. Pop. 3,000.

FORCE, Manning Ferguson, American soldier and author: b. Washington, D. C., 1824; d. 1899. He was the son of Peter Force (q.v.) He was graduated at Harvard College 1845 and at the Harvard Law School, entering the army in the Civil War as major of the Twentieth Ohio Volunteers, and attaining the rank of brevet major-general of volunteers. Refusing a colonelcy in the regular army, he resigned from the service, practised law and was judge of the Court of Common Pleas of Hamilton County, Ohio, 1867–77, and judge of the Superior Court of Cincinnati 1877–88. He published ‘From Fort Henry to Corinth’ (1881); ‘Marching Across Carolina’ (1883); ‘Personal Recollections of the Vicksburg Campaign’ (1885); ‘Life of Justice John McLean’ (1885); ‘Life of W. T. Sherman’ (1889). He edited Walker’s ‘Introduction to American Law’ (1878), and Harris’ ‘Principles of Criminal Law’ (1880).

FORCE, Peter, American historian: b. near Little Falls, N. J., 26 Nov. 1790; d. Washington, D. C., 23 Jan. 1868. His life work, entitled ‘American Archives,’ a valuable collection of 22,000 books and 40,000 pamphlets, was bought by the government (1867) and placed in the Library of Congress. He published also 'Grinnell Land: Remarks on the English Maps of Arctic Discoveries in 1850–51' (1852); and 'Notes on Lord Mahon's History of American Declaration of Independence' (1855).

FORCE, the impulse which tends to impart motion to a body at rest, or to increase or diminish the velocity or change the direction of a body already in motion. This impulse is attributable to the action of some other body. It is to be noted that while force tends to produce motion, that may not be the result. The force acting may be inadequate to overcome existing forces, and it becomes simply pressure;— as, for example, a force of 10 pounds acting against a mass of stone weighing 10 tons. In this case the attraction of the earth is the greater force which the impulse of 10 pounds is insufficient to overcome. But, in general, force is considered in its visible effect motion. In this connection Newton's Laws of Motion become applicable. They are: (1) If a body be at rest, it will remain at rest; or if it is in motion, it will move uniformly in a straight line until it is acted upon by some force. (2) If a body be acted on by several forces at once, it will be influenced by each as though the others did not exist, whether the body be at rest or in motion. (3) If a force act to change the state of a body with respect to rest or motion, the body will offer a resistance equal to and directly opposed to the force: in other words, to every action of a force upon a body is opposed an equal and opposite reaction.

The quantity of motion possessed by a body is called its momentum. The value of the momentum of a body is found by multiplying its mass by its velocity. The change in quantity of motion possessed by a body under the action of a force is proportional to the magnitude of the force and to the time during which the force acts.

Forces are classified as (1) Momentary, or impulsive forces; and (2) Continuous, or permanent forces. If a continuous force is uniform in its action it is called a constant force, and is measured by the momentum it imparts to the body upon which it acts.

A force is said to be "central," when it acts always toward a definite centre, which may be either fixed or in motion. The gravitative forces with which the heavenly bodies act upon one another are of this character, and are often popularly called "centripetal" (that is, "centre-seeking") forces for this reason. When a body is caused to move in a curved path, it exerts a force which acts along the radius of curvature of the path, and in a direction away from the centre of curvature. Forces of this nature are called "centrifugal" (or "centre-fleeing"), and familiar examples are afforded by the pressure of swiftly moving water against the curved vanes of a turbine water-wheel, and by the tension produced in a string when a stone that is attached to the string is whirled rapidly about in a circle. The nature of centrifugal force has been the subject of more or less controversy, some authorities maintaining that it should not be classed as a true force, since it does not produce any acceleration in the direction in which it acts;— that is, a particle on the rim of a swiftly revolving wheel does not fly off radially when it is liberated, but merely continues its motion with unaltered speed, in the direction in which it was moving at the instant of its liberation;— or tangentially to the wheel. The subject is too technical for extended discussion in this place, but it may be pointed out that such a particle is actually subject to a radial acceleration, if its motion is considered *relatively to the wheel.*

Forces are said to be "conservative" when the principle of the conservation of energy holds true for the system in which they occur. (See ENERGETICS). All forces of nature are believed to be fundamentally conservative, although this has not yet been rigorously proved for the forces that prevail within animals and plants.

A "field of force" is any region in which a given force has a sensible magnitude. A conductor charged with electricity, for example, exerts an attractive (or repulsive) force upon all bodies that are exterior to it, and, from the point of view of theoretical physics, this force still exists at an infinite distance from the charged body, though at such a distance it becomes infinitesimal in intensity. A familiar illustration is the operation of the earth's attraction upon the moon. From a practical standpoint, however, the "field of force" due to the charged body can be considered to be limited by an indefinite but finite boundary, whose distance from the body depends upon the intensity of the charge, and also upon the order of minuteness of the forces that can be regarded as negligible, so far as any effect upon the problem that happens to be under consideration is concerned. Within a closed conductor there is no field of electric force, so long as the charges upon the conductor itself, and in the region external to it, are in equilibrium. This fact may be demonstrated mathematically, and it was abundantly proved experimentally by Faraday.

The unit of force among English-speaking people is the "pound." This term is used to designate that impulse which would give to a body weighing one pound a motion of 32.1740 feet per second, or, if the body were already in motion, would accelerate its motion by so much, for each second of time during which it acts. Suppose, for example, that a uniform force of magnitude represented by F acts for T seconds upon a body having the mass M, thereby increasing (or diminishing) its velocity by V units. The magnitude of the force F will be equal to MV divided by T, and by substituting numerical values for the symbolic letters a concrete result may be obtained. If M is expressed in grammes and V in centimeters per second, the resulting value for F will be in dynes. Consult Poorman. A. P., 'Applied Mechanics' (New York 1917). See ELASTICITY; ELECTRICITY; GRAVITATION; MECHANICS.

FORCE BILL, a popular name in the United States for four different congressional bills, used at the time of their passage; all aimed at the South, and intended to suppress by national force direct or indirect nullification (q.v.) of national laws. (1) The bill of 2 March 1833 to enforce the tariff law; drawn out by Calhoun's nullification ordinance passed by the South Carolina legislature (see COMPROMISE OF 1833); also called the "Bloody Bill." It was not put in action, because South Carolina first suspended and then repealed the Nullification

Ordinance. (2) The bill of 31 May 1870 to put down the forcible resistance which the Southern leaders were preparing to offer to the reconstruction governments. It punished by fine and imprisonment, or both, and gave the Federal courts exclusive cognizance of any interference with the registration, voting, etc., of any one, or going on his premises to intimidate him, or personating him in voting or violating State or Federal election laws, or violating the Civil Rights Bill of 1866. (3) The bill of 20 April 1871 to suppress the Kuklux Klan (q.v.). It gave the Federal courts cognizance of suits against any one depriving another of any constitutional rights; punished as conspiracy any combination to delay the execution of any Federal laws, or deter any one from voting, holding office, or acting as Federal juror or witness; (this clause was held unconstitutional by the Supreme Court); authorized the President to employ the national forces to suppress disorders intended to deprive any class of their constitutional rights, in case the State authorities were unable or unwilling; suspended the habeas corpus «during the continuance of such rebellion» — this provision to remain in force only till the end of the next regular session; authorized the judges to exclude from the juries persons they suspected to be in complicity with the proscribed acts; authorized civil action for damages against all persons who neglected to give warning of such a conspiracy or intended injuries, if they had good reason to suspect them; and confirmed former civil-rights legislation. An attempt was made to extend the fourth suspension of the habeas corpus to May 1872, and the Senate did so, but the House refused. (See RECONSTRUCTION). (4) The Lodge Election Bill, 2 July 1890, «to amend and supplement the election laws of the United States, and to provide for a more efficient enforcement of such laws.» It passed the House, but was tabled in the Senate by a free-coinage fusion of Democrats and Republicans who wished to pass to currency legislation.

FORCE DE CHEVAL, fôrs dĕ shĕ-val' (horse power), a French unit of power equal to 736 watts and is analogous to our «horsepower» unit, which is equal to 746 watts. See MECHANICAL UNITS.

FORCE OF GRAVITY. The force of gravity finds expression in that law of physics which declares that every mass is attracted by every other mass with a force varying directly as the product of the masses, and inversely as the square of their distances from one another. In the matter of movable bodies upon the earth's surface the term gravity has been given in a restricted sense to the pull which the mass of the earth exerts upon a body near the earth and free to move toward it, or, as we say, a *falling* body. Under the law quoted the falling body attracts the earth upward in the proportion of its mass, but the effect is so infinitesimally small that it cannot be considered. It is found that gravity acts upon a body allowed to fall from a height with a pull that is uniform within experimental distances at the same latitude, and that this pull is greater the nearer we are to the centre of the earth; that is, the pull is greater at the poles than at the equator, because the distance from the poles to the earth's centre (3949.790 miles) is less than from the equator to the centre (3963.225 miles). The device which scientists have made use of to determine the force of gravity acting at different points on the earth's surface is the pendulum, which, of course, swings because of the action of gravity. (See PENDULUM). Where the pull of gravity is greatest, a pendulum of a given length will swing faster than where it is less: that is, a pendulum of a certain length will swing faster at the poles than at the equator. The procedure, therefore, is to select the length of pendulum which will beat seconds of time at every place of investigation. Then, from the equator as we approach the poles the pendulum to beat exactly one second at each swing must obviously be continually lengthened, and from these changing lengths may be calculated the force of gravity which necessitated the changes. The following table shows the lengths in inches of the second-pendulum at latitudes five degrees apart, from the equator to the poles (north or south), and the resulting value for the accelerating pull of gravity per second upon a falling body.

Equator, 39.0131 inches: 32.0875 feet per second
5° 39.0152 inches: 32.0888 feet per second
10° 39.0200 inches: 32.0927 feet per second
15° 39.0274 inches: 32.0989 feet per second
20° 39.0378 inches: 32.1074 feet per second
25° 39.0506 inches: 32.1178 feet per second
30° 39.0652 inches: 32.1299 feet per second
35° 39.0816 inches: 32.1433 feet per second
40° 39.0990 inches: 32.1576 feet per second
45° 39.1169 inches: 32.1724 feet per second
50° 39.1348 inches: 32.1871 feet per second
55° 39.1524 inches: 32.2015 feet per second
60° 39.1687 inches: 32.2150 feet per second
65° 39.1835 inches: 32.2271 feet per second
70° 39.1962 inches: 32.2377 feet per second
75° 39.2067 inches: 32.2462 feet per second
80° 39.2143 inches: 32.2525 feet per second
85° 39.2190 inches: 32.2564 feet per second
90° 39.2206 inches: 32.2577 feet per second

The above values are for sea-level at the latitudes noted. For localities above the sea-level the velocity will be 0.0002 for each 1,000 feet of elevation. As a rule, the force of gravity is a little less than the value given for places far inland, and a little more for places directly on the seacoast. The theoretical length of the pendulum in feet is expressed by the formula $3.25114\ [1 + 0.005302 \sin^2 \Phi - 0.000007 \sin^2 2\ \Phi]$. This is the length at the sea-level, Φ standing for the latitude north or south of the equator.

The acceleration due to gravity at the places named below are from figures published by the Smithsonian Institute at Washington.

Calais, Maine — 32.1728 feet per second
New York City — 32.1612 feet per second
Washington, D. C. — 32.1558 feet per second
Charleston, S. C.— 32.1372 feet per second
St. Georges, Bermuda — 32.1446 feet per second
Key West, Fla.— 32.1184 feet per second
New Orleans — 32.1883 feet per second
Kansas City, Mo.— 32.1518 feet per second
Denver, Colo.— 32.1393 feet per second
Pike's Peak — 32.1178 feet per second
Salt Lake City — 32.1462 feet per second
San Francisco — 32.1528 feet per second
Port Simpson, B. C.— 32.2000 feet per second
Yakutat Bay, Alaska — 32.2122 feet per second
Fort Egbert, Alaska — 32.2237 feet per second
Honolulu — 32.1184 feet per second
Tokio — 32.1182 feet per second
Sidney, Australia — 32.1435 feet per second
Singapore — 32.0892 feet per second
Cape Town — 32.1395 feet per second
Pampaluna, Spain — 32.1633 feet per second
Geneva, Switzerland — 32.1723 feet per second
Berlin — 32.1935 feet per second
Paris — 32.1837 feet per second
Kew, England — 32.1915 feet per second
Spitzbergen — 32.2528 feet per second

FORCELLINI, fôr'chĕl-lē'nē, **Egidio,** Italian philologist: b. near Padua 1688; d. 1768. He was educated at the Seminary of Padua, where he came under the favorable notice of Giacomo Facciolati who made him his associate. Forcellini spent most of his active life in compiling a single large lexicon, the preparation of which involved the most painstaking and arduous labor for many years.

FORCHHAMMER, fôrk'hăm-mĕr, **Peter Wilhelm,** German archæologist: b. Husum, Schleswig, 23 Oct. 1801; d. 8 Jan. 1894. He received his education at the Lübeck gymnasium and at the University of Kiel, with which he was connected for 65 years. In 1830–34 and 1838–40 he traveled in Italy, Greece, Asia Minor and Egypt and in 1843 was appointed professor of philology at Kiel. In 1871–73 he represented the progressive party of Schleswig-Holstein in the German Reichstag. His published works deal mostly with topography and ancient mythology. According to him the myths arose from definite local, especially atmospheric and aquatic, phenomena, and represented the annually recurring processes of nature as the acts of gods and heroes. These theories are elaborated in his ‘Hellenika’ (1837); ‘Griechenland’; ‘Achill’ (1853); ‘Daduchos’ (1875); ‘Die wanderungen der Inachostochter Io’ (1881); ‘Erklärung des Ilias auf Grund der topischen und physischen Eigentümlichkeiten der troischen Ebene’ (1884); ‘Prolegomena zur Mythologie als Wissenschaft und Lexikon der Mythensprache’ (1891); ‘Homer: Seine Sprache, die Kampfplätze seiner Heroen und Götter in der Troas’ (1893). Consult Bursian ‘Biographisches Jahrbuch für Altertumskunde’ (Vol. XX, Berlin 1897).

FORCHHEIM, fôrk'hīm, Bavaria, town of Upper Franconia near the confluence of the Wiesent and the Regnitz, 15 miles south-southeast of Bamberg. It has fine churches, a progymnasium and an orphanage. Its industries include spinning and weaving, bone and glue works, brewing and papermaking, bleaching and dyeing establishments, etc. Forchheim is of ancient origin and in the 9th century was the residence of the Carlovingians, including Charlemagne. In 1007 the town passed to the bishop of Bamberg, in whose possession it remained almost continually until 1802, when it was ceded to Bavaria. In 1838 its fortifications were dismantled. Pop. 9,150.

FORCIBLE ENTRY AND DETAINER. A phrase belonging to law which relates to the keeping of real property, by threats or violence, from its rightful owner. In such cases as clearly show intentional exclusion of the real owner from his property, the latter can have recourse to law; but even he may not force an entrance into his premises — so sacred is the presumptive right of possession in the eyes of the law. Public peace, too, would seem to be the other valid consideration involved in seeking to compel disputants to settle their disputes in a court of justice.

This law dates from the time of Richard II of England, before which time an owner had full right to take possession of his property *by force,* if necessary. Since that time, however, a number of statutes have limited the owner's right to his property as indicated above. The owner, however, does not forego any property rights by merely abstaining from forcible entry thereto; nor does this passivity on his part establish the least bit of presumption in favor of the illegal possessor. The law, which has been enacted in every State in this country, merely limits his mode of retaking possession to a legal process. Further than this, the owner's rights to his property are not invalidated in the slightest degree. Besides the United States and England, most other civilized countries have similarly modified the common law by statutes affecting forcible entry.

FORCING, in gardening, is a term used to designate a process in which artificial heat is applied so that flowers, fruits or other products of plants are obtained at a date or season other than that at which they may be had in the ordinary course of culture. Thus, for example, kinds of grapes which by the simple influence of the heat of the sun in a vinery do not ripen till September or October are induced by forcing to ripen in March or later, according to the period the process is commenced; and strawberries, which ripen from June to September, in the forcing-house yield their fruit from February onward. Conducted, as the system is, during the short days of the year, the chief obstacle the gardener has to contend with is diminished light. This in the case of forcing fruits taxes his skill to the utmost, because abundant light is essential both to the proper fertilizing of the flowers and to the perfecting of the fruit. Some vegetables and salads and many flowers are, however, more successfully forced in the dark than in light. Rhubarb, seakale, mushrooms, lily of the valley, lilac, are all forced in greater or less darkness. A hotbed of fermenting manure is used to force rhubarb. Among flowers, roses, carnations, lilies of the valley, azaleas, deutzias, violets, mignonette and sweet peas are those most commonly forced, along with such bulbs as hyacinths, tulips and narcissi. By the application of an atmosphere containing ether, the forcing of certain flowers, particularly lilacs, has been much accelerated, and a quick and regular development secured, but the process is yet in an experimental stage. Consult ‘The Forcing Book,’ by L. H. Bailey (1897); ‘Greenhouse Construction and Greenhouse Management,’ by L. R. Taft (1903); W. J. May's ‘Greenhouse Management’ (3d ed., 1900).

FORD, Edward Onslow, English sculptor: b. London 1852; d. 23 Dec. 1901. He studied in Antwerp and Munich, and was made a Royal Academician of London in 1859. His artistic faculty was displayed in felicitous portraiture, and he executed striking statues of many eminent contemporaries, including Queen Victoria, Huxley, Gladstone and "Chinese" Gordon. The Marlowe Memorial at Canterbury and the Shelley Memorial at University College, Oxford, are also from his chisel.

FORD, Sir **Francis Clare,** English diplomat: b. 1828; d. 1899. He became a lieutenant of the Fourth Light Dragoons, entered the diplomatic service in 1851 and was appointed secretary of legation at Washington. He became secretary of embassy at Saint Petersburg in 1871 and was appointed to a similar post at Vienna. Subsequently he was successively minister to Argentina and Uruguay, Brazil, and Greece. In 1884 he was made minister to Spain, becoming ambassador in 1887; in 1892 he went as ambassador to Constantinople and was transferred to Italy the year following. In 1884–85 he was British Commissioner to settle the question of the Newfoundland fisheries and served in a similar capacity before the International Commission at Halifax in 1897 over the Washington fisheries.

FORD, Henry, American automobile manufacturer: b. Greenfield, Mich., 30 July 1863. He was educated in the district school of Greenfield and learned the trade of machinist. Since 1887 he has lived in Detroit. He was for a time chief engineer of the Edison Illuminating Company; in 1903 he organized and has since been president of the Ford Motor Company, the largest manufacturer of automobiles in the world, employing 20,000 persons and turning out over 2,000 machines per day. In January 1914 Mr. Ford announced his plan of profit-sharing involving the distribution of $10,000,000 annually to employees. He chartered a ship and at his own expense conducted a party to Europe, leaving New York 4 Dec. 1915, with the object of organizing a conference of peace advocates to influence belligerent governments to end the war. He returned home after reaching Christiania, Norway, but the members of his party proceeded to Stockholm and Copenhagen, and through Germany to The Hague, effecting an organization represented abroad by a special committee. After the entrance of the United States into the war Mr. Ford's various plants were in great part converted to the production of aeromotors, etc. In 1918 Mr. Ford, at the instance of President Wilson, announced his candidacy for the Senate of the United States. He won the Democratic nomination at the September primaries, but lost the Republican nomination. Among his numerous public benefactions is the Henry Ford Hospital built at a cost of $2,000,000.

FORD, Henry Jones, American publicist: b. Baltimore, Md., 25 Aug. 1851. He was graduated from the Baltimore City College in 1868, was connected with the *American* and *Sun* of Baltimore and the *Sun* of New York, and in 1901 became editorial manager of the Pittsburgh *Commercial Gazette* and *Chronicle-Telegraph*. He entered university work in 1906 as lecturer in the Johns Hopkins University, and also in the University of Pennsylvania. In 1908 he was elected professor of politics in Princeton University, and still occupies that chair. He has published 'The Rise and Growth of American Politics' (1898); 'The Cost of Our National Government' (1909); 'The Scotch-Irish in America' (1915); 'The Natural History of the State' (1915); 'Woodrow Wilson: the Man and His Work,' and has also contributed numerous articles to periodicals. In 1911 he was for some months Banking and Insurance Commissioner of New Jersey, pending a reorganization of that department, on the completion of which he resigned the office.

FORD, James Lauren, American journalist: b. Saint Louis, Mo., 25 July 1854. He was educated at Stockbridge, Mass., removed to New York in his youth and there entered the journalistic field. He also became interested in the drama and successfully adapted two plays. In his works he satirizes freely the affectations and unrealities of many things in American life and literature. He has written several volumes among which are 'Hypnotic Tales' (1891); 'The Literary Shop' (1894); 'Bohemia Invaded'; 'Dolly Dillenback.' He is also the author of books for young readers, 'Dr. Dodd's School' (1892); and 'The Third Alarm' (1893); 'Cupid and the Footlights' (1899); 'The Story of Du Barry' (1902); 'The Brazen Calf' (1903); 'The Wooing of Folly' (1906). He also edited, with Mary K. Ford, 'Every Day in the Year' (1902; new ed., 1914).

FORD, Jeremiah Denis Matthias, American educator: b. Cambridge, Mass., 2 July 1873. He was educated in Ireland, at Harvard University and the University of Paris. From 1895 to 1907 he was instructor and assistant professor of Romance languages, in 1897–98 Harris traveling fellow, and after 1907 Smith professor of French and Spanish languages. Since 1912 he has served also as chairman of the department of Romance languages at Harvard University. In 1904 he was lecturer at the Catholic Summer School, and in 1913 represented Harvard in a tour of Latin America in which he visited the principal institutions of higher education. From the University of Santiago de Chile he received an invitation to return as visiting lecturer in Spanish on Spanish literature. He is a member of the Royal Spanish Academy, Madrid, and vice-president of the Modern Language Association of America. He wrote 'Old Spanish Sibilants' (1900); 'Spanish Composition' (1901); 'Spanish Anthology' (1901); 'Spanish Grammar' (1904); 'Romances of Chivalry in Italian Verse' (new ed. 1906); 'Old Spanish Readings' (1906). He edited 'Selections from Don Quixote' and various texts for schools, and is a contributor to *Modern Language Notes*, the *Romanic Review*, *Romania*, etc.

FORD, John, English dramatist: b. Devonshire 1586; d. after 1639. He printed his first tragedy of the 'Lover's Melancholy' in 1629. This, however, was not his first play, as a comedy of his, entitled 'A Bad Beginning has a Good End,' was acted in 1613. His genius is seen at its highest in the tragedy, ''Tis Pity Shee's a Whore' (1633), though the subject is repulsive. He wrote, or assisted to write, at least 11 dramas. Most of these were exclusively his own composition; but some of them were written in conjunction with Decker and others. Other plays by him are 'The Broken Heart' (1633); 'Love's Sacrifice' (1633); 'Perkin Wharbeck' (1634); 'The Fancies Chast and Noble' (1638); and 'The Ladies' Trial' (1638).

FORD, John Donaldson, American naval officer: b. Baltimore, Md., 19 May 1840. He was graduated at the Maryland School of Design in 1861 and at the Potts School of Mechanical Engineering in 1862. He entered the United States navy in 1862 as third assistant engineer, was made second assistant engineer in 1864, first assistant in 1868, passed assistant in 1874, and chief engineer in 1890. During the Civil War he took part in the recapture of Baton Rouge, La., 1863, and the battles of Mobile Bay, 1864. He was on board the *Arizona*, which was destroyed by fire off Poverty Point in the Mississippi 27 Feb. 1865, and was wrecked in the *Sacramento* on the Coramandel coast of India in June 1867. He served also on many expeditions and stations. In 1884 he was detached and ordered to start the Baltimore Manual Training School. In 1896–98 he was on the U. S. S. *Brooklyn* and in the latter year became fleet engineer of the Pacific station. He joined the Asiatic fleet and took part in the actions of 1 May and 13 Aug. 1898; the destruction of the Spanish fleet off Cavite; the destruction of the batteries at Cavite and at Sangley Point, and the capture of the forts at Corregidor and the capture of Manila. He was commissioned commander in 1899, was promoted captain in March 1902, promoted rear admiral and retired 19 May 1902, but continued on duty as inspector of machinery and ordnance at Baltimore and Sparrows Point, Md., until 25 Dec. 1908. He is the author of several pamphlets on manual training; 'An American Cruiser in the East' (1900), and many professional papers.

FORD, John Thomson, American theatrical manager: b. Baltimore, Md., 1829; d. 1894. He was manager of the Holliday Street Theatre of Baltimore, was elected president of the city council in 1858 and also served two years as acting mayor. He built and operated three playhouses in Washington, D. C., in one of which President Lincoln was assassinated. Ford was suspected of complicity, and was imprisoned for 40 days, but was released as no evidence against him was forthcoming. A few years later (1871) he built Ford's Opera House in Baltimore.

FORD, Patrick, editor of *The Irish World* for 43 years: b. Galway, Ireland, 12 April 1837; d. Brooklyn, 23 Sept. 1913. At 19 he came to America with his parents and found employment in Boston in William Lloyd Garrison's printing office, where *The Liberator* was published. He began writing for Boston newspapers in 1855, and in 1860 became editor of the *Boston Sunday Times*. He served in the Civil War and later founded the *Charleston Gazette* in South Carolina. In 1870 he started in New York *The Irish World,* which became famous as a champion of Irish Home Rule. For the Land League Fund the paper raised $343,072 during 1880–81. He wrote 'Criminal History of the British Empire' (1881); 'The Irish Question and America Statesmen' (1885).

FORD, Paul Leicester, American author: b. Brooklyn, N. Y., 23 March 1865; d. New York, 8 May 1902. He founded and edited the *Bibliographer* which he kept at a high standard. Besides numerous pamphlets relating to American historiography his works include 'The Honorable Peter Sterling' (1894), a novel of New York society; 'The True George Washington' (1896); 'Bibliotheca Hamiltonia'; 'Franklin Bibliography'; and an edition of the works of Thomas Jefferson (1897), with notes, biographical introduction, etc.; 'The Story of an Untold Love'; 'Tattle Tales of Cupid' (1898); 'Short Stories'; 'Janice Meredith' (1899); 'Wanted — a Matchmaker'; 'Wanted — a Chaperon' (1902).

FORD, Richard, English critic and author: b. London, 1796; d. 1858. Having traveled in Spain visiting the various art centers, he contributed articles dealing with Spanish art and architecture to the *Quarterly Review*, and published 'Handbook for Travellers in Spain' (1845), describing the countries and cities, the natives and their manners, antiquities, religion, legends, fine arts, etc., with notices on Spanish history.

FORD, Simeon, American hotel proprietor: b. Lafayette, Ind., 31 Aug. 1855. He was educated in the public schools and engaging in the hotel business was for many years proprietor of the Grand Union Hotel, New York. He is a member of the firm of Ford and Shaw and president of the official Hotel Red Book and Directory Company, and of the Zeeland Realty Company. He is treasurer of the Apollinaris Agency Company and director of the Rye Land and Improvement Company, the Columbia Bank, the Henry Morganthau Company, etc. He is a favorite at all gatherings of hotel men and is widely known as a witty and popular speaker. He published some of his speeches under the title 'A Few Remarks' (1903).

FORD, William Webber, American bacteriologist: b. Norwalk, Ohio, 15 Dec. 1871. He was graduated at Western Reserve University in 1893 and in medicine at Johns Hopkins in 1898. In 1899–1901 he was fellow of McGill University and in 1901–02 of the Rockefeller Institute, New York. In 1903–05 he was instructor, in 1905–06 associate, and since 1906 associate professor of hygiene and bacteriology and lecturer on legal medicine at Johns Hopkins. He is a member of the Maryland State Board of Health, of the American Association of Pathologists and Bacteriologists and of other scientific societies, American and foreign. He has published papers on bacteria, toxins and anti-toxins, milk, sewage, water supply, etc.

FORD, Worthington Chauncey, American author and statistician: b. Brooklyn, N. Y., 16 Feb. 1858. He is a brother of P. L. Ford (q.v.). He was chief of the bureau of statistics, Department of State, 1885–89, and of the bureau of statistics in the Treasury Department in 1893–98; was connected with the Boston Public Library 1897–1902, and was chosen lecturer on statistics in the University of Chicago in 1901. From 1902 to 1909 he was chief of the division of manuscripts in the Library of Congress. In 1909 he was made editor of the publications of the Massachusetts Historical Society and lectured at Harvard in 1910. He published 'American Citizens' Manual' (1883); 'The Standard Silver Dollar' (1884); 'George Washington' (1899); and numerous monographs on historical, biographical and economic subjects. He revised David A. Wells' 'Natural Philosophy' (1879); and edited the 'Correspondence and Journals of Samuel Blachley Webb' (1893–94); 'The Writings of George Washington' (1889–91); 'The Journals of the Continental Congress' (1905); 'John Quincy Adams' (1902); 'List of B. Franklin's Papers in the Library of Congress' (1905); 'Writings of John Quincy Adams' (3 vols., 1913).

FORD CITY, Pa., borough of Armstrong County, 40 miles northeast of Pittsburgh, on the Allegheny River and on the Pennsylvania Railroad. Agriculture, coal-mining and plate glass-making are the principal industries. The borough owns the electric-lighting plant and the waterworks. Pop. 4,850.

FORD PEACE PARTY. See Ford, Henry.

FORDHAM, N. Y., in the borough and county of Bronx. Prior to 1874 it was a village in Westchester County, N. Y. It became part of the city of Greater New York in 1898. In 1671 Jan Arca bought the land from the Indians and Andrian von der Donck and settled here. Fordham University was founded here in 1841 at Saint John's College. Edgar Allan Poe lived at Fordham from 1844 to 1849 and wrote 'The Bells' and other pieces here.

FORDHAM UNIVERSITY, formerly **Saint John's College**, an institution in New York, opened 24 July 1841, under the auspices of the Roman Catholic Church. The land upon which the college stands is a part of the old Dutch village of Fordham, and is of historic interest. In 1639 the land between the Harlem and Bronx rivers was purchased by the Dutch West India Company, from three Indian sachems. In 1694 the land which is now the college property came into possession of the Corsa family. The farm was known as "Rose Hill," a name which still clings to the place and by which the college was known in earlier years. In 1787 the "Rose Hill" farm was purchased by John Watts and later it passed through several owners to Horatio Shepherd Moat. In 1838 Moat built the stone house which is now the central college building, and which contains the principal offices and the reception room. In 1839 the new house and a farm of 80 acres were purchased by John Hughes (q.v.), the coadjutor bishop of New York, for $29,750. John McCloskey (q.v.) was first president, and for the five years the college was in charge of secular priests, four clergymen, who afterward became bishops, three who became archbishops and one a cardinal, were associated with its government or were members of the faculty. After several years of secular management the college passed to the Jesuits, who were invited to take charge by Archbishop Hughes. The first Jesuit rector was the Rev. A. J. Thébaud. On 10 April 1846 the Act of Incorporation was passed which made the school a university with power to grant all degrees usually granted by a university. In 1846 and 1860 the Fathers of the Society of Jesus bought the buildings and a portion of the 80-acre tract and took charge of the college. The area of the college grounds is about 70 acres, bounded east and south by Bronx Park. The group of 10 gray stone buildings presents an attractive and imposing appearance: the 1904 addition to the buildings, a hall built on the site of the "Rose Hill Manor House" (1690), cost about $130,000.

In June 1904 law and medical departments were authorized by the trustees in addition to the arts course, and in 1907 the charter was amended by the Board of Regents of the State University to establish these and to change the name from Saint John's College to Fordham University. A college of pharmacy was provided for in 1912. The average student enrolment is 1,600. There are 150 professors and instructors and 65,000 volumes in the library. Consult Taafe, T. G., 'History of Saint John's College, Fordham' (New York 1891).

FORD'S THEATRE, a Washington theatre in which President Lincoln was shot by the assassin, Booth, 14 April 1865. The United States government purchased the building in 1866 and it was at first used as the Army Medical Museum, but after 1887, as the Pension and Records Bureau of the War Department. It gradually fell into ruin, however, and suddenly collapsed with the loss of several lives, 9 June 1893.

FORDUN, John of, known as the father of Scottish history: b. probably at Fordoun, Kincardineshire, about 1310; d. about 1386. He wrote the first five books of his 'Chronica Gentis Scotorum,' bringing the history down to the middle of the 12th century, and also a part of the sixth volume, which was completed by Walter Bower, abbot of the monastery of Inchcohn. He enlarged the first five books and added 11 new ones, bringing the history down to 1437. Several editions have been printed, the best probably being that of W. F. Skene (Edinburgh 1871-72).

FORDYCE, fôr'dīs, Ark., town and county-seat of Dallas County, 76 miles south of Little Rock, on the Chicago, Rock Island and Pacific and the Southwestern railroads. It contains manufactories of lumber, spokes and staves. Pop. 2,794.

FOREARM. See Arm.

FORECASTING THE WEATHER. See Meteorology.

FORECLOSURE is the process of law by which right of a mortgagee, or of anyone having interest in a mortgage, in the event of the conditions of the mortgage being violated, may compel the mortgagor to redeem the pledge or forfeit his right of redemption. This is done by filing a bill for foreclosure. The court may, on application of the mortgagee, mortgagor or any encumbrancer of the mortgage, grant, under certain conditions, a sale of the subject instead of foreclosing the mortgage, the money raised by the sale being applied to the payment of the mortgage, any surplus being claimed by subsequent mortgagees, or in the event of no other claim, being paid to the mortgagor. The laws of the United States vary in the matter of foreclosure. See Mortgage.

FOREFATHERS' DAY, the day celebrated as the anniversary of the landing of the Pilgrims; first commemorated in 1769. Owing to a mistake in the change of Old Style (11 December) to New it was made 22 instead of 21 December.

FOREIGN ATTACHMENT. See Attachment; Garnishment.

FOREIGN BUDGETS. See Budgets, Foreign.

FOREIGN COINS AND THEIR AMERICAN EQUIVALENTS. See Coins, Foreign, American Equivalent of.

FOREIGN CORPORATIONS. See Corporations, Legal.

FOREIGN EXCHANGE. See Banks and Banking—Foreign Exchange (Article 5).

FOREIGN INDUSTRIAL ORGANIZATIONS. See Labor Departments, Foreign; Labor Legislation, Foreign; Labor Organizations, Foreign.

FOREIGN JUDGMENT, in law, is the term applied to the judgment of a foreign tribunal. Such judgment is proved in common law by exemplifications certified under the great seal of the state or country where the judgment is recorded, or under the seal of the court where the judgment remains; the fulfilment of its conditions depends upon treaty stipulations or on international comity.

FOREIGN LAWS, the laws of a foreign country. The courts do not judicially take notice of foreign laws; and they must, therefore, be proved as facts. Exemplified or sworn copies of written laws and other public documents must, as a general thing, be produced when they can be produced. The effect of foreign laws, when proved, is probably referable to the court; the object of the proof is to enable the court to instruct the jury what is, in point of law, the result from foreign laws to be applied to the matters in controversy before them. The court is, therefore, to decide which is the proper evidence of the laws of a foreign country, and when evidence is given of those laws the court is to judge of their applicability to the matter in issue.

FOREIGN STATES. In law, every nation is foreign to all other nations; and the several States of the American Union are foreign to each other, with respect to their municipal laws. The reciprocal relations between the National government and the several States, however, are considered not as foreign, but as domestic.

FOREIGN WEIGHTS AND MEASURES. See WEIGHTS AND MEASURES.

FOREKNOWLEDGE AND FOREORDINATION. See FOREORDINATION.

FOREL, fō'rĕl, **Auguste [Henri]**, Swiss psychologist: b. Morges, Vaud, 1848. He was educated at the universities of Zürich and Vienna and in 1877 was appointed lecturer at Munich. In 1879 he was made professor of psychiatry at the University of Zürich, from which he resigned in 1897. He published 'Les fourmies de la Suisse' (1874); 'Der Hypnotismus' (1889; 6th ed., 1911; Eng. trans. 1906); 'Gehirn und Seele' (11th ed., 1910); 'Die psychischen Fähigkeiten der Ameisen und einiger anderen Insekten' (1904; Eng. trans. by Wheeler, 'Ants and Some Other Insects,' 1912); 'Hygiene der Nerven und des Geistes' (1903; 4th ed., 1913; Eng. trans., 'Hygiene of the Nerves and Mind,' 1907); 'Die Sexuelle Frage' (9th ed., 1909; 1913; Eng. trans., 'The Sexual Question,' 1908); 'Sinnesleben der Insekten' (1886; 1910; Eng. trans., 1908).

FORELANDS, North and South, two headlands on the southeast coast of England, county of Kent. North Foreland projects into the sea in the form of a bastion and consists of chalky cliffs nearly 200 feet high. South Foreland consists also of chalky cliffs about 400 feet in height, and has two lighthouses, with fixed lights, erected upon it.

FORENSIC MEDICINE. See MEDICAL JURISPRUDENCE.

FOREORDINATION, or **PREDESTINATION,** a term appropriated by theology, and the basis of long discussions and controversies in the 19th century. The doctrine is now generally abandoned. In the Calvinistic system, the assignment of the Deity, at the time of creation, of some of his creatures to eternal life and happiness and others to eternal death or suffering. Of course the decree was not, as usually stated, irrespective of the spiritual merits of the subjects; but if human beings it was irrespective of their actual conduct on earth. This was supposed to be irrelevant, as through the fall of Adam they had lost all possibility of merit and owed any escape they might have from utter destruction to God's grace and Christ's vicarious atonement, which restored some of them to moral health. As none of them deserved anything, there could be no injustice in leaving such as he chose to suffer the penalty assigned. It was not alone Adam's dereliction which had caused this liberty of choice, however, as angels were included: the Westminster Confession says, "By the decree of God, for the manifestation of his glory, some men and angels are predestinated unto everlasting life and others foreordained to everlasting death." This implies that no created being has any claim to other than destruction except by divine grace. Being contrary to the principle that "God is love," modern Christians rarely endorse it.

FORESHORE, the part of the seashore which lies between the ordinary high-water and low-water mark at ordinary tides. At common law, title to the foreshore rests *prima facie* in the Crown, except where it may be vested in a subject by ancient grant or charter from the Crown, or by prescription. For rights and liabilities in respect to the foreshore consult Moore, S. A., 'History of the Foreshore.'

FORESHORTENING, in drawing in perspective, the shortening of a part whose length is mainly between the artist and his point of sight. It is more or less difficult for a student to grasp the correct reproduction of say an arm that is thus shortened. In the case of mural paintings that are viewed from below, the artist deliberately alters the natural foreshortening up and down to produce a normal effect on the observer.

FOREST. See FORESTRY IN THE UNITED STATES.

FOREST CITY, Pa., borough of Susquehanna County, 22 miles northeast of Scranton, on the Delaware and Hudson, the Erie and the New York, Ontario and Western railroads. It has extensive agricultural, coal-mining and silk manufacturing interests. It was incorporated in 1888 and its government is vested in a burgess and a council of one chamber. Pop. 5,749.

FOREST FIRES. Fire is probably the worst of the many destructive agencies at work in the forests of the United States. Until recent times, however, the attitude of settlers and lumbermen toward fires in the woods was either one of indifference because the supply of timber seemed inexhaustible or of inertia because fires were considered unavoidable. It required enormous losses of life and property to arouse the people to the necessity of systematic fire protection. During the last 50 years an annual average of about 70 people lost their lives in forest fires and at least $25,000,000 worth of timber a year was destroyed. In addition, immense damage was done every year to young tree growth, crops, livestock, buildings and improvements, water courses and the soil. Some of the great fires have become historical on account of the number of lives lost or the property destroyed. The Peshtigo, Wis., fire in 1871 burned 1,280,000 acres of timber and cost 1,500 human lives. The Hinckley fire of 1894 burned over 160,000 acres in Minnesota, destroyed property valued at $25,000,000 and cost the lives of 418 persons; the great Idaho fire in 1910 burned 2,000,000 acres of timber and caused the death of 85 people. But these great fires, though they partake of the nature of national calamities, are not the ones that cause most of the damage; it is the smaller fires, of which little notice is taken but which occur year after year and with great frequency, that cause the greatest loss in the aggregate. At least 35,000 of these occurred in the United States in 1915. It is customary to distinguish three classes of forest fires; surface fires, which burn dry leaves, grass, brush and small trees; ground fires, which burn the vegetable mold; and crown fires, which burn through the crowns of the trees. Surface fires are fought by beating them with blankets, gunny sacks, green brush, etc., by throwing water or dirt upon the flames, or by running a trace in front of them by raking away the leaves and other litter and then beating out the flames when they are checked. Sometimes a furrow is plowed as an emergency fire line. Ground fires are usually hard to check. If the layer of vegetable mold is not very deep, it may be possible to put out the fire with water or sand. Otherwise it is necessary to dig a trench down to the mineral soil. Crown fires are very unusual and extremely hard to check. They usually burn themselves out, are stopped by some natural obstacle such as a stream, or are checked by means of back firing. The most important of the known causes of forest fires are lightning, sparks from locomotives and carelessness with camp fires, matches, cigarettes, etc. Though lightning causes a great many fires, much the larger proportion are started through the malice or carelessness of men and are therefore preventable. The most effective safeguard against fire in the woods is an enlightened public sentiment in regard to it. Such a sentiment is now being created not only in the national forests and their vicinity but, through the co-operation of the State and Federal agencies, in other timbered portions of the country. It is impossible to prevent all fires, however, and a patrol and fire-fighting system is necessary. Great progress in this direction has been made lately. Organized fire protection has been established in the national forests and in most of the State forest reservations. On the national forests the protective system is highly organized and efficient and over 45 per cent of the fires that start are put out before they have covered more than a quarter of an acre and over 70 per cent before they have covered more than 10 acres. This result is secured by means of patrols and lookouts, the building and maintenance of roads, trails and telephone lines through the forests and the preparation before the opening of each fire season of plans for the mobilization of fire-fighting forces. Thus the moment a fire is seen by the lookout or patrol it is necessary only to ascertain its exact location, its size and the direction and force of the wind; the ranger in charge knows from his plan just where he can secure most quickly men and equipment and how to get them to the fire. A number of States have developed systematic fire protection on private lands through the organization of State fire wardens. In some instances private owners have formed co-operative associations for fire protection and employ a regular force of rangers for patrol during the fire season. Fire protection in the States has been greatly stimulated through the operation of the Weeks Law. In spite of all that has been done, however, a large proportion of the forests of the country, particularly those that are privately owned, are inadequately protected from fire. See FORESTRY IN THE UNITED STATES.

FOREST-FLY, the British name for the minute parasitic, flea-like flies called bird-ticks, bat-ticks and the like, in America; specifically *Hippobosca equina*, which is especially a torment to horses by thrusting its long beak through the skin and sucking the blood. See BIRD-TICK.

FOREST LAWS, in English law, legal restrictions regarding forests of the king. Forest laws applied not only to the royal forests of England but to Scotland as well.

The area subject to the jurisdiction of these courts in England included not only woodland but often pastures and villages. Some of these forests dated from the Anglo-Saxon period. Up to the time of Edward I their area was constantly added to by various kings by a summary proceeding known as afforestment. This consisted of a proclamation made by the king to the effect that any tract of land he desired, without compensation to the owner, was to be constituted a forest, after observing certain formalities, a right which it seems he had by common law. All offenders in such forests were punished by forest law and not by common law. There were three forests courts: woodmote, swainmote and justice seat. The woodmote was a court of attachment and had jurisdiction over minor offenses only, but could not convict. This court was presided over by verderers, officers chosen by freeholders of the forest. The swainmote had power to try and convict, but no power to pass judgment. It was presided over by the verderers, and all freeholders were obliged to attend. The court of justice seat had jurisdiction over all civil and criminal offenses committed in a forest. This court sat every third year and was presided over by the justices in eyre.

Under some of the kings of England the penalties for violations of the forest laws were inordinately severe, blinding and even death being the penalty for killing game during the reign of Henry I. These laws were mitigated by King John, but only under compulsion. Edward I finally abolished afforestment by force, yielding to the earnest desires of his subjects.

There were many royal forests in Scotland, but the code to which they were subject contained no such severe penalties as that of England, although otherwise the codes are very similar.

During the latter half of the 19th century Parliament disafforested, under the plea of public necessity, three royal forests, those of Whittlewood, Wichwood and Hainault. Epping Forest, which forms part of the ancient Waltham Forest, was the subject of legislation by Parliament in 1871, and as a result was declared open to the public by Queen Victoria in 1882, the ancient court of verderers being revived. There are still royal forests in England and the Crown has certain rights in private forests in a limited number of places to this day.

FOREST OAK, commercial name of the timber of *Casuarina torulosa* and allied species of Australian trees. It is much used for shingles and makes a good fuel. Certain species are used in cabinet work.

FOREST PARK, Ill., village in Cook County, on the Illinois Central and the Chicago and North Western and other railroads, about four miles from Chicago and near Oak Park. The first permanent settlement was made in 1854, and the village of Forest Park was incorporated as Harlem in 1883, and its name was changed in 1907. It adopted the commission form of government in 1912. It is a residential suburb of Chicago, and is noted for its race track. (See HORSE-RACING). Waldheim and Forest Home cemeteries are in Forest Park. A monument to the men executed as anarchists who were connected with Chicago riots of 1886 is in the Waldheim cemetery. The village owns the waterworks and electric-light plants. Pop. 6,594.

FOREST PARK COLLEGE, Saint Louis, Mo., incorporated and chartered by the State of Missouri in 1889, to give a full college course exclusively to women, has full power to confer such literary and other degrees and honors as are usually conferred by the Association of American Colleges, of which it is a member. The four buildings, the main one 187 feet long, in grounds covering nine acres, occupy a beautiful site on a high plateau, sloping down to Forest Park and overlook the city of Saint Louis. The departments comprise junior college of liberal arts, preparatory college, college of music, school of art, school of oratory and expression, and school of household economics. The faculty numbers 23.

FOREST REGIONS. See FORESTRY IN THE UNITED STATES.

FOREST RESERVES. See FORESTRY IN THE UNITED STATES.

FOREST SCHOOLS. The earliest practical course in forestry in the United States was given in 1897, in the State University of Montana, under Maj. George P. Ahern, U. S. A., who later took charge of the Bureau of Forestry of the Philippine Islands. Major Ahern discontinued the course in the spring of 1898, on account of the breaking out of the Spanish-American War. There were no schools of forestry in this country before 1898. In that year the first effort was made to establish professional instruction in forestry in this country when the Biltmore Forest School was opened at Biltmore, N. C., and the New York State College of Forestry was established in connection with Cornell University. The former school offered a one-year course, supplemented by six months of work in the forest familiarizing the student with the practical problems of the woods. Because of its organization and methods this school remained in a class by itself until its disbandment in 1914. The Cornell school, which offered a four-year course of training and had begun to graduate students, was discontinued in 1903. Instruction was resumed at Cornell in 1911 by the New York State College of Agriculture in connection with the university. A five-year course is offered, leading to the degree of Master of Forestry. The Yale Forest School, which offers a two-years' post-graduate course leading to a Master's degree, was established in 1900. Professional schools of forestry were established not long after, in 1903, at the State universities of Minnesota, Michigan and Nebraska. In the same year the Pennsylvania State Forest Academy was created for the purpose of training men for the Pennsylvania State Forest Service. The attendance is small and limited to residents of the State. Students are appointed after competitive examination, and must serve the State for three years after graduation. In the Pacific States, forest instruction was first given at the University of Washington in 1907. Numerous other colleges and universities established courses, and the rapid growth of instruction in forestry has been phenomenal. At present there are 23 forest schools offering courses leading to professional degrees. These schools are at the University of California, Colorado State Agricultural College, Colorado College, Cornell University, University of Georgia, Georgia College of Forestry, Harvard University, University of Idaho, Iowa State College of Agriculture, University of Maine, Michigan Agricultural College, the universities of Michigan, Minnesota, Missouri, Montana and Ohio, Oregon Agricultural College, the Pennsylvania State College, Pennsylvania State Forest Academy, Syracuse University, State College of Washington, University of Washington and Yale University. Twelve of these confer the degree of Master in Forestry upon the completion of post-graduate courses. The Harvard and Yale Forest Schools are graduate schools, requiring for admission a Bachelor's degree from an institution of standing. Ranger courses, fitting men for work as rangers, or guards, and other practical woods work, are offered at Oregon Agricultural and Washington State colleges and the universities of California, Georgia, Idaho, Missouri, Montana, Syracuse and Washington. In addition to these professional and ranger courses, short courses covering the different phases of forestry and related subjects are given in over 40 technical schools, colleges and universities. See FORESTRY IN THE UNITED STATES.

FOREST SERVICE. See FORESTRY IN THE UNITED STATES.

FOREST TREES OF AMERICA. Out of the great mass of forest growth in the United States and Canada, stretching from the palms on the southernmost keys to the birches and willows that creep into the Arctic Circle, certain trees stand forth as possessing unusual interest. Some of them are noted principally for the beauty of their flowers, conspicuous among these being magnolias, dogwoods (*Cornus*); the gay red-bud (*Cercis*); the buckeyes (*Æsculus*); and the wild-crab (*Malus coronaria*); or, for their equally attractive fruit, which is sometimes much sought by birds, animals, aborigines or even by civilized folk. Thus the service berries (*Amelanchier*); the mountain-ashes (*Sorbus*); the wild cherries and plums (*Prunus*); and the persimmon (*Diospyros*) furnish food for man, bird and beast. Thorns (*Cratægus*); hollies (*Ilex*); sumachs (*Rhus*); manzanita (*Arctostaphylos*); madrono (*Arbutus*); mesquit (*Prosopis*), are very ornamental as well.

Other trees have historical connections that lend them interest, as is the case of the sassafras (*Sassafras*) to which were attributed so many medicinal virtues that the earliest explorers of the Atlantic coasts came partly in quest of cargoes of its spicy bark. The little palmetto of the Southern States (*Sabal*) appeared on the cockades, flag, medal and seal of South Carolina, possibly because the defenses of Charleston during the Revolution were constructed of their trunks, which absorbed the British cannon balls instead of splitting and thus resisted destruction. The white pine (*Pinus strobus*) has a similar distinction, having been depicted, very appropriately, upon some of the earliest American-Colonial, naval and New England flags. The giant pines, sometimes over 100 feet high, of this New England region furnished masts not only for shipping in general but for the Royal Navy, although the Royal reservation of selected trees for this purpose was continually disputed, especially in New Hampshire. Pepys notes with relief in 1666 "Very good news is come of four New England ships come home safe to Falmouth with masts for the king; which is a blessing mighty unexpected and without which, if for nothing else, we must have failed the next year." Outside of its naval uses, until it became too scarce, white pine was the most used of its family, of which it is also the most valuable, having soft, fine-grained, buff-colored heart-wood easily worked, glued and painted, neither warping nor shrinking, and therefore of great value for furniture and interior finish, as well as for more ordinary purposes. Its place now, perforce, is taken by the heavier, more resinous southern pines, one of which (*Pinus palustris*) also yields southern naval stores; and by the giants of the race, the yellow Western pine (*Pinus ponderosa*) and the sugar pine (*P. Lambertiana*), so called from the sweet exudation of its cambium layer, that flourish on the mountain ranges of the Far West, and occasionally reach a height of more than 175 feet. The latter furnishes the widest and clearest boards of any pine. Pine nuts yielded by *P. Sabiniana, P. monophylla,* and other species are esteemed by men and squirrels who harvest them regularly.

Growing in restricted groves in California mountains, their distance from the sea said to be limited by the range of sea-fogs, are the marvelous redwoods (*Sequoia*), including those "Big Trees," a few of which are saved from destruction only by State and Federal protection. These giants often more than 250 feet in height and thousands of years old present a tempting mark for lumber interests, who would split them up for the soft red, light, very durable timber, invaluable for shingles, grapevine stakes and many other uses, since the wood is straight-grained, easily split and worked and will receive a high polish. Other coniferous groups of the West include those Douglas firs or spruces (*Pseudotsuga taxifolia*), next to the Sequoias, the most gigantic trees of the Pacific forests, ordinarily growing 180 feet high. In dense stands their straightness and clearness of bole especially adapts them for masts and spars and derrick-booms. They resemble the graceful hemlocks (*Tsuga*) growing on both sides of the continent, the timber furnished by the Western species being the most valuable. Hemlock bark is an important tanning material and served with rancid salmon oil formed a peculiar item of the dietary of some of the Northwestern Indians. Spruces (*Picea*), many of which are planted for ornament for the sake of their symmetrical growth, thick foliage and color, yield a wood for rough construction work and are also one of the important sources of wood-pulp. Another genus of conifers likewise crushed for paper pulp is Abies, the firs. The aromatic balsam fir (*Abies balsamea*), moreover, stores a thin turpentine in its "blisters" called Canada balsam and its nearly scentless wood is liked for food-tubs. The rest of the genus furnish rough lumber. But the great source of pulpwood lies in the otherwise unimportant aspens, trees which cover the plains of northwestern Canada, and the larger poplars (*Populus*).

There are a number of trees which yield wood that is pre-eminently suitable for cabinet work or for interior finish of the finer sort, or for beautiful furniture. Two of them, black walnut (*Juglans nigra*) and the wild cherry (*Prunus serotina*), are so scarce at present that they have become very valuable. Wild cherry was formerly plentiful, especially along the northern Appalachians, where it attained to its greatest size, about 100 feet in height. It has shining and poisonous foliage, a medicinal bark and bears heavy crops of small black berries, most attractive to birds. The heart-wood is reddish-brown, readily seasoned, straight and fine of grain, capable of receiving a satiny finish. It was a favorite material for furniture and cabinet work since it did not warp or shrink and took glue well. Early settlers finding cherry growing on the best farming soils destroyed it ruthlessly before discovering its value, consigning it to the fire or fence. They did the same to the easily-split black walnut which encumbered the earth with huge trunks that shot up for a hundred feet, clear of trunk if crowded in the forest, throwing out great limbs when growing in open spaces. Its rich-brown heartwood, straight-grained in general, but mottled and waved in crotch and root, heavy, hard and durable, satiny when polished, was in great demand as a cabinet wood and also valuable for gun-stocks and veneers. Nowadays the demand has revived and old fence-rails, stumps and even furniture are being sought for veneers and the like. Its congener, the butternut (*Juglans cinerea*) or white walnut, is also used for interior finish, having a charming satiny wood of a paler tint and lighter weight than black walnut. Both have rich-kerneled nuts that are valuable and were made into a kind of paste or milk by the Indians. Bark and shells of the latter species furnished that Colonial dye called "butternut brown."

Beeches (*Fagus*) are favorite trees for lawn planting on account of their splendid forms, delicate spray and silvery, smooth bark. They bear many small, sweet, triangular nuts that are a favorite food of hogs, being known as «mast.» The wood is close-grained and hard, used for turning, for tool handles and particularly for clothes-pins. The heartwood of certain birches (*Betula*), a favorite material for spools, also serves for furniture, being sometimes stained to resemble cherry and mahogany. The black birch (*Betula lenta*) is one of the best species for this purpose and its spicy bark is distilled for the sake of its essential oil, very like and sometimes substituted for wintergreen oil. The gray or white bark of other species has caused them to be planted for ornament; Indians bent the great sheets of parchment-like bark of the paper birch (*Betula papyrifera*) into baskets and light canoes. Other trees of lesser importance in cabinet-making are the great tupelos and red gums (*Nyssa*), (*Liquidamber*) of southern bottom-lands, whose pale-brown heartwood has been hitherto considered too difficult to season and too gnarled and interlaced of fibre for profitable use except in paving blocks or small articles where its non-splitting qualities were an asset, but is now being utilized for barrels and boxes, flooring, interior finishing and furniture, under such names as Circassian walnut. The Western larch (*Larix*) also yields a red cabinet wood capable of a high finish.

Maple, especially in its waved and mottled forms, oak and ash are also made into furniture, but their wood is of greater general value. Maple particularly is in demand for flooring. The sap of the most important species (*Acer Saccharum*) is sweet and is crystallized into sugar, an art learned from Indians. Being regular in form and prodigal of handsome foliage the maples are adapted for ornamental uses. The leaves assume very brilliant colors, flaming scarlet in the soft maple (*A. rubrum*). This species, with the large-leaved (*A. macrophyllum*) and the silver maple (*A. saccharinum*) are to be planted in France to mark the graves of fallen Canadian soldiers, a maple leaf being the badge of that country and of its troops.

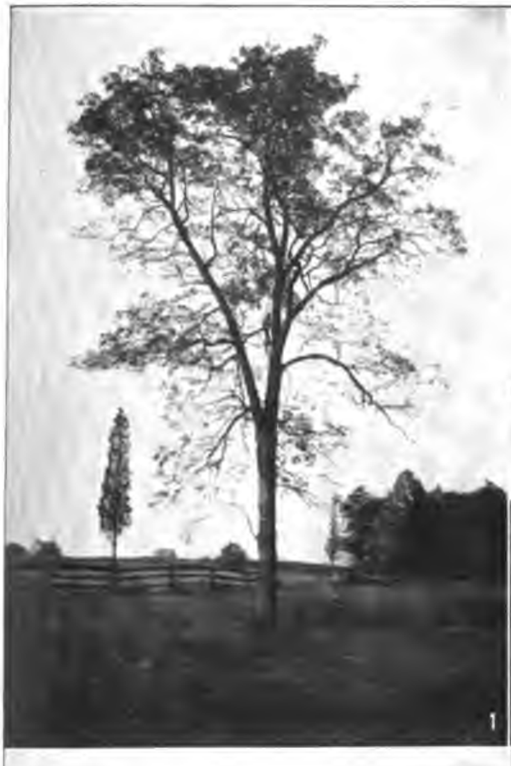
The slow-growing white oak (*Quercus alba*), often spared by the farmer to shelter his stock in pastures, where it spreads wide its heavy branches, forming a wide dome-shaped head, represents the most durable, strongest and most generally suitable wood of all the valuable timber trees in this group, for the infinite variety of uses to which the timber is put. The acorns of certain Western species furnish a regular crop of acorns gathered by Indians in the locality as a staple food. The bark of other species, particularly that of the chestnut oak (*Q. Prinus*) of the East, and the tanbark oak (*Q. densiflora*) of the West, is used for tanning, while that of the quercitron (*Q. velutina*) or black oak, contains a yellow dye-stuff. The Garry oak (*Q. Carryana*) of the West is important because it is the only oak of that region which has valuable wood The pin oak (*Q. palustris*) is often planted for ornament, its lower branches sweeping the ground, while the middle ones are horizontal and the upper ones ascending.

Carriage- and wagon-building has always called for woods that are tough, elastic, pliable, strong and durable or unsplittable, according to their predestined use. Tough ash (*Fraxinus*), which is also a favorite material for oar-making and agricultural implements, is one of these necessary woods. The white ash (*Fraxinus Americana*), is one of the straight-stemmed forest trees that exceed 75 feet in height and are scattered more or less among other hardwoods throughout the East, arriving at its best estate in the bottom-lands of the lower Ohio. Ash trees, on account of their rapid growth and comparative freedom from disease, are favorite ornamental trees for street and lawn and pasture. But the graceful elm is more frequently seen, especially in New England. Although distressed by noxious insects, the American elm (*Ulmus Americana*) is one of the most beautiful trees that can be planted, its slender arching branches forming a vase-shaped head, with pendulous spray. Like that of the ash, its tough, hard wood, split with difficulty, is used in agricultural implements as well as vehicles, for small cooperage, the bottoms of wheelbarrows and for other purposes where its peculiar qualities are utilized. The slippery elm (*U. fulva*) furnishes a mucilaginous bark.

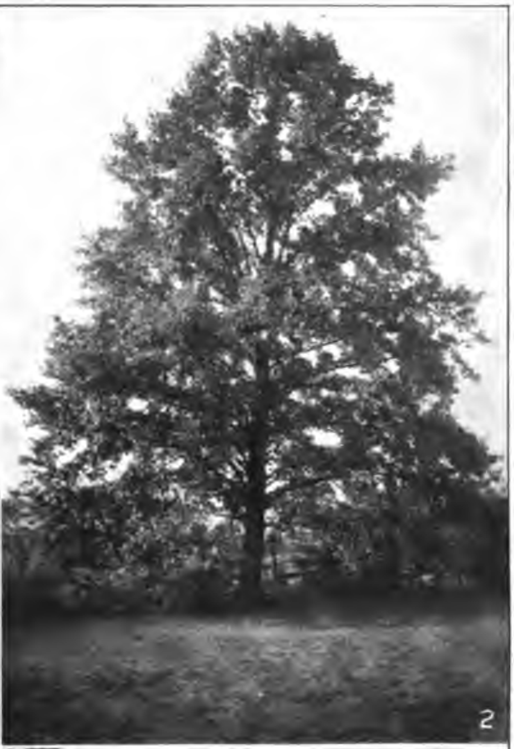
Several hickories (*Hicoria*) are employed in vehicle-building, the wood being unique for its toughness and elasticity, which makes it invaluable for light but strong carriages. The hickories also bear edible nuts, those from trees with «shag» or «shell» bark as (*H. ovata*) being preferred. H. Pecan bears the thin-shelled, sweet pecan nuts of commerce. Linden trees (*Tilia*) whose drooping flowers are so prodigal of nectar and so alluring to bees that they are often called «bee trees,» supply a soft, fine-grained wood that by steaming can be bent into shapes suitable for carriage panels. In the spring, too, its bark can be separated into «bast,» long, tough ribbons used by florists as a tie-material instead of strings, whence its common name of basswood. The tulip-tree (*Liriodendron tulipifera*) has several names, yellow poplar being perhaps the most common one, although carpenters speak of the pale-tinted kinds as «whitewood.» Among the soft woods it ranks next to white pine and «cuts like cheese» and is superior to linden for carriage panels. The tree has a a characteristically straight tapering trunk if grown in forests, arriving at more than 100 feet, but throws out limbs forming a huge cone where it has room. The orange-splashed, tulip-shaped, lemon-colored flowers borne at the tips of branches among pale-green quaintly-shaped foliage, as well as its stately growth, make this a fine ornamental tree.

There is a great demand for trees that are strong and tough, and above all durable when in contact with the ground, for telephone and telegraph poles, fence-posts, railway sleepers or «ties» and sills. Before blight threatened to exterminate them, chestnut trees (*Castanea dentata*) were chosen and even planned for this purpose, their timber being light, strong in young trees and easily split for these purposes, as well as for furniture, interior work, foundations for veneers and the like. It also bears delicious, thin-shelled nuts in prickly burrs. The locust (*Robinia pseudacacia*), that is often planted as an ornamental tree on account of its heavy clusters of fragrant, honey-yielding white flowers and is known as «Acacia» in Europe, is another source of a hard, heavy, durable timber for fence-posts. The varying

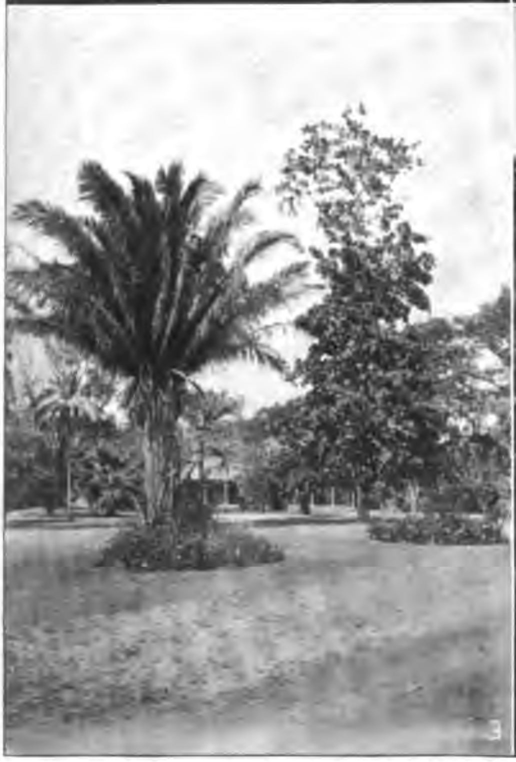
FOREST TREES



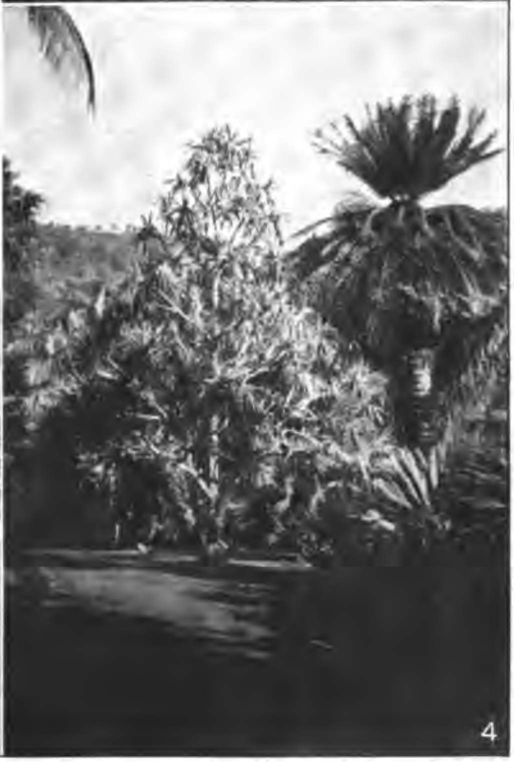
1 **Shagbark Hickory (*Hicoria ovata*)**



2 **Tulip Tree (*Liriodendron tulipifera*)**



3 **a. Cohune Palm (*Attalea colume*); b. Mahoe (*Hibiscus elatus*)**



4 **Sago-palm (*Cycas circinalis*) (right); Screw-pine (*Pandanus utilis*) (centre)**

color of the heartwood has caused it to be called yellow, green, red and even black locust. Out of it are made tough ringing policemen's clubs. Its good qualities are shared by the heavily-armed honey locust (*Gleditsia triacanthos*), of which the fruits are heavy pods filled with sweet pulp. The osage orange (*Toxylon pomiferum*), although of moderate size only, furnishes a hard yellow wood used somewhat as a substitute for fustic and is suitable for ties and fence posts; it is, moreover, a favorite hedging plant where it is hardy. Hardy catalpa (*Catalpa speciosa*) is another tree which has been planted experimentally to furnish ties and poles. It grows very rapidly and produces wood that is among the most durable kinds known, but the trees have a tendency toward crooked growth.

Among conifers the Douglas fir is used for poles and ties where more durable timber does not exist, and the long leaf pine (*Pinus palustris*), rapidly vanishing, is used in the South. The red cedar of the East (*Juniperus Virginiana*) has ruddy heartwood which is one of the most valuable in America, not only for posts but for pencils, this soft, easily-cut, fragrant wood superseding every other kind for the latter purpose, when it can be cut from the great trees that form groves in middle Tennessee. Since its odors repel insects, clothes-chests and closets are often made of cedar. Bald cypress (*Taxodium distichum*), very often used in place of pine, especially when exposed to the weather, is another post tree ornamental as well for its height and symmetry, growing to great height and bulk in swampy land, where it thrusts out of the water peculiar growths called «Knees.» It is deciduous like the tamarack (*Larix laricina*), a common tree in Canada, whose tall slender boles are considered to be the strongest and most durable of Canadian woods not only for posts but for ship's keels and masts. Tall-growing white cedars, or arbor-vitæ (*Thuya*), whose flattened, fan-like spray is familiar in hedges, are very durable when exposed to the weather as posts or shingles. The giant Western species (*T. plicata*) averages more than 150 feet in height, having in maturity a curiously fluted conical trunk, covered with a tough stringy bark, inner layers of which are converted by Indians into fabrics and baskets. It is called red cedar or simply «cedar» in the West, more than half of the shingles in the United States being manufactured from its fragrant, reddish, light and durable wood. Consult Browne D. J., 'The Trees of America' (New York n. d.); Elliott, S. B., 'Important Timber Trees of the United States' (Boston and New York 1912); Fuller, A. S., 'Practical Forestry' (New York 1884); Henkel, A., 'American Medicinal Barks' (United States Department of Agriculture, Bureau of Plant Industry Bulletin 139, Washington 1909); Small, H. B., 'Canadian Forests' (Montreal 1884); Sudworth, G. B., 'Forest Trees of the Pacific Slope' (United States Department of Agriculture, Forest Service, Washington 1908), and many pamphlets issued by the United States Department of Agriculture.

HELEN INGERSOLL.

FOREST TREES, Tropical. Most interesting trees grow between the tropics, some of which have traveled quite around the globe. A vast number of economic products, exclusive of the more important tropical fruits, derived from them, have been carried far and wide since the dawn of commerce. The character of these forests varies greatly, influenced by waterfall and altitude. This is illustrated in Porto Rico where «the various formations in the order of their occurrence from the coast toward the interior are as follows: Littoral woodlands, moist deciduous forests, and tropical rainforests on the north or humid side, and the dry deciduous forest on the south or semi-arid side.» These different formations overlap more or less, or disappear but are to be recognized everywhere in the tropics.

The most obvious difference lies between those trees growing on hot dry areas like the Liguanea plain in Jamaica, where rain falls perhaps twice a year and then in torrents, and those forming dense forests on the nearby mountains, where rain and fogs are frequent. In dry soil the trees grow sparsely, and are apt to be low and broad of head, with foliage subdivided, and sometimes armed with thorns. The leguminous tribe is usually well represented. In the jungle, however, the arborescent growth is more interesting to the eye. The foliage is often evergreen, thick and glossy with waxen coatings designed to shed water, and simple of outline. In the heat and moisture of these damp deciduous and tropical rain forests, as Colonel Roosevelt remarks, «The struggle for life among the forest trees and plants is far more intense than in the North. The trees stand close together, tall and straight, and most of them without branches, until a great height has been reached; for they are all striving toward the sun, and to reach it they must devote all their energies to producing a stem which will thrust its crown of leaves out of the gloom below into the riotous sunlight which bathes the billowy green upper plane of the forest.» The trunks of these trees are usually pale gray or pallid in hue, and many of them have brilliant flowers such as those crowning the bois immortelle, which are, however, unsuspected by the stroller beneath, unless the forest floor be littered with gay petals fallen from their place under the sun, where only an aeronaut or mountain climber can see them. Huge vines or lianes, which rise upward with the trees that they embrace, are characteristic of these forests; some are as straight and thick as saplings, others are twisted and contorted; others cling inseparably to the boles. Some clothe the tree-trunks with verdure, others hang naked like ropes dangling from a ship's rigging. The trees are moreover loaded with masses of epiphytic plants, ferns and mosses. Orchids form huge tufts, or trail in long flowering streamers, and stiff wild pines hold water in the cup-like bases of their leaves in which little batrachians bathe. These features are most easily seen at the edges of clearings laboriously hacked out with cutlass or machete for garden patches. Tropical forests are continuously destroyed and steep hills left bare for the action of erosive forces, by these small cultivators who supply most of the constant supply of green-stuff used in towns. They cut down the giant trees with all their burdens and either consume them in charcoal kilns or in huge bonfires that are a characteristic sight among the mountains, burning like beacons night and day, and often burning over more territory than is required. The ashes supply fertilizer, and when the ground is exhausted in a few years the gardeners repeat the process.

As in the north, certain tropical trees are notable. Such are the banyan (*Ficus Bengalensis*), an individual tree soon becoming an umbrageous grove by sending down roots from its branches, and its near relative, the sacred bo-tree, or peepul (*Ficus religiosa*) in whose ever-quivering foliage dwell Indian gods. Sometimes eccentric growth, like those swollen trunks of bottle trees (*Sterculia*) of Australia, makes them noticeable or some peculiar usage, as when the easily-hollowed trunks of baobabs (*Adansonia digitata*), are utilized for cisterns for storing water caught in near-by tanks during the rainy season — an adaptation of great service during the recent campaigns in Africa. Often it is the flowers that attract, as is the case of the flaming Spathodea Nilotica, or of the royal poinciana (*Poinciana regia*). The succulent, golden corollas of the Indian mahwa (*Bassia latifolia*), falling profusely, bring the peasantry in crowds to feast on the fleshy petals, that sometimes save them from starvation, and to distil from them a nauseous intoxicating liquor. The sacred and fragrant asoka (*Saraca Indica*) and champaca (*Michelia Champaca*), on account of their flowers are planted about Eastern temples for ceremonial use. The delightfully-scented flowers of the latter are used as a cheap drug and are also the source of a perfume said to be substituted for that of the more valuable ylang-ylang (*Cananga odorata*), a huge tree of the Philippines, whose tassel-like flowers retain their odor even when dried and were hawked about the streets of Manila in trays for sachets. The fluffy, yellow flower-balls of several acacias, more particularly those of the aromo, huisache, cassie or popinac as the Acacia Farnesiana is variously denominated, are similarly plucked for their odor. Likewise, nearly the whole of the citrus tribe contribute essences for perfumers' uses, as does also the Eucalyptus citriodora, and that very large South American tree, Dipteryx odorata, whose fruits — tonka beans — were formerly scented snuff. Balsams of Peru and of Tolu (*Myroxylon*) and other fragrant gums and resins extracted from tropical trees, as well as the odorous heartwood of lign aloes (*Aquilaria*) and sandalwood (*Santalum*), find their way into perfumery.

Pungent camphor is distilled from the wood of *Camphora officinalis* and many other drugs are taken from tropical trees, sometimes from the fruit, as from the cylindrical pods of the golden flowered Cassia fistula, or from those red and white nuts of Kola, which are so greatly sought by Africans that they pass from hand to hand as currency; or from the bark, as in the case of Cinchona, so long jealously guarded by its Andean discoverers; of the West Indian quassia (*Picraena excelsa*), a substitute for the Oriental Quassia amara; or the Jamaica dogwood (*Piscidia erythrina*); or of the winter's bark (*Drimys Winteri*).

Saponaceous materials are obtained from soap bark (*Quillaia*) and from the soapberry (*Sapindus*). Cocum butter is extracted from the seeds of Garcinia Indica; shea butter, used for food and illumination along the Niger, from the nuts of Bassia, a genus that is rich in oil-yielding species. Candlenuts (*Aleurites moluccana*) are so oily that they were formerly strung on grasses in Hawaii and burned as candles. The cohune palm (*Attalea Cohune*) and the African oil palm (*Elæis Guineensis*), among others, yield commercial oils, and wax is shaken or scraped from those two palms Copernicia and Ceroxylon. Ben oil, a favorite with perfumers, comes from the horseradish tree (*Moringa*).

Even the juices of tropical trees are utilized. South America boasts of the cow-tree (*Galactrodendron utile*), from which when gashed flows a quantity of thick white fluid, cream-like in consistency, and bearing a slight astringency in taste. The naseberry (*Achras Sapota*) secretes «chicle» gum, and a number of different trees furnish that milky sap which hardens into rubber or guttapercha. The pigment gamboge is derived from the yellowish sap of Garcinia Morella.

An orange red dye, used for coloring dairy products, is obtained from the arils of annatto or achiote seeds (*Bixa orellana*); but more important dye-stuffs are the heartwood of fustic (*Chlorophora tinctoria*) tinting yellow; of Brazilwood (*Cæsalpinia Brasiliensis*) dyeing red, and of the graceful logwood (*Hæmatoxylon Campechianum*) yielding fine blues and blacks. Logwood flowers profusely, and bees make one of the finest kinds of honey from the fragrant blossoms.

Cabinet woods are another commercial product of the tropics that is very valuable. Sandalwood, camphorwood and cedar (*Cedrela odorata*) are favorite materials for clothes-chests and boxes, since the aromatic and fragrant woods repel insects. Cabinet makers went to the East for their hard sable ebony (*Diospyros ebeneum*), for the blackwood (*Dalbergia*) so much used by the Chinese, for teak (*Tectona grandis*) for carving, and for the shimmering satinwood (*Chloroxylon Swietenia*); but South America and the West Indies have their satinwoods (*Fagara* and *Simaruba*), and also an ebony (*Brya ebenum*), besides rosewood and the peerless mahogany (*Swietenia mahogoni*) which seekers discover by climbing other trees to locate the mahogany by its delicately-cut pale foliage, among other methods. They also have the ale-brown wavy-grained yacca (*Podocarpus*), a conifer, and the mountain mahoe (*Hibiscus elatus*) vividly striped with green and white. In the Philippines the yellow or reddish heartwood of molave (*Vitex*), narra (*Pterocarpus*), tindalo (*Pahudia rhomboidea*) and the dark-brown walnut-like acle (*Pithecolobium acle*) are valued for furniture and cabinet making.

The wealth of the tropics in timber trees is scarcely realized or drawn upon. Some of the trees are so hard and heavy that carriage from their site is prohibited, even if their habitat were not often in utterly inaccessible locations; and if they could be fetched away they would be too difficult to work with profit, or too limited in usefulness. On the other hand some tropical woods are surprisingly soft and light. The Lauan group of the Philippines may be compared to soft pine, being used for light construction and furniture. Ochroma, or balsa-wood (*Ochroma lagopus*) of the West Indies is so buoyant that it is used as a substitute for cork, and is said to be the lightest wood in the world; its relative, the silk cotton or ceiba (*Ceiba pentandra*), a huge tree regarded by negroes with much respect if not worshipfully, is not much heavier. Its enormous boles, braced by those sinuous narrow-walled, buttressing roots that are so characteristic of many gigantic tropical trees, dominate open glades in the forest. They have been hollowed out for dug-out canoes by the natives, who made paddles, from the thin walls of the buttresses. The «floss» or «silk,» a soft fibrous material surrounding the seeds, is more important than the timber, being used as an upholstery material called «Kapok,» and as a moisture-defying, weightless padding for soldiers' bedding in the trenches. It resembles the red silk-cotton of the Eastern «Simal» (*Bombax Malabaricum*) of the same family.

Among the heavy woods, teak (*Tectona grandis*), second only to mahogany in value, is famous for its durability in tropical climates. When properly seasoned — in Burma, the tree is girdled and left standing dead on the stump for years,— it can be floated out of the forests. It is also partially resistant to insect attacks and those of teredos which is a very important property in the tropics, and is mainly used for shipbuilding and for carving, as are also the bibiri (*Nectandra rodioei*) or greenheart, which is the chief article of export from British Guiana, which is insect and teredo proof and is therefore especially useful for under-water construction.

Trincomali wood (*Berria Ammomila*) and Sal (*Shorea robusta*) are valuable Oriental trees for general construction, and timber from various species of gums (*Eucalypti*) and Kauri (*Dammara Australis*), which include some of the tallest trees of the world, are invaluable to Australasia. The ubiquitous tamarind (*Tamarindus Indica*) offers another useful wood, and in the countries about the Caribbean we find the small but exceedingly hard lignum-vitæ (*Guaiacum officinale*) famous for its wearing qualities, the locust (*Hymenæa Courbaril*), the yokewood (*Catalpa longissima*) of very general usefulness; the ausubo (*Sideroxylon fœtiddissima*); the candlewood, or tabanuco (*Dacryodes excelsa*); the lance wood (*Oxandra lanceolata*) very elastic and exported for shafts and fishing rods; the crab-wood (*Carapa guienensis*); the tropical cedar (*Cedrela odorata*) made up into cigar boxes; and a host of other trees. The Philippines produce the ipil (*Intsia*), particularly durable when cut for ties; betis (*Illipe betis*), and the aranga (*Homalium*) and liusin (*Parinarium griffithianum*) valuable for salt-water construction as in wharfs.

Bamboos attaining to the height of trees, although really enormous grasses, have an infinite variety of uses ranging from food to house construction and surround the globe. The curious mangrove swamps that lie on sheltered shores are equally common throughout the tropics, and are raided for fuel, pilings, and, in the Far East, for tanbarks and dyes. Other tannins are obtained from the twisted pods of divi-divi (*Cæsalpinia coriaria*), and from Australian wattles, especially from the golden wattle (*Acacia pycnantha*) and the black wattle (*A. decurrens*), the latter being cultivated also in Hawaii. Cutch is a product of A. Catechu. Acacias, moreover, yield fine and durable wood, sometimes fragrant, and many commercial gums, as gum arabic. The kair tree (*A. Catechu*) of India is there considered to be even more durable than teak, and to be uninjured by insects, while A. Koa of Hawaii is said to be the best timber in that territory.

A common tree on tropical shores is the yellow-flowered tulip-tree, or emajaguilla (*Thespesia populnea*) which is a favorite shade, timber and ship-building tree in India. Its bark yields a strong fibre for tying bundles. It belongs to the mallow family famous for its fibres, which also includes the emajagua or mountain mahoe (*Hibiscus elatus*) that furnishes a fibre compared to jute, used for cordage and also for millinery. Its inner bark was stripped for tying cigars and was known as «Cuba bast.» An extraordinary form of these netted bast fibres exists in the lace-bark-tree (*Lagetta lintearia*) which can be pulled into open meshes much resembling a coarse white fabric. A white cloth is manufactured in Africa from uganda bark-cloth trees (*Brachystegia*). The mulberry family is also redundant in bark fibres, clothing and sacks being evolved from the bark of the upas tree (*Antiaris toxicaria*), while the finest and whitest cloth and mantles worn by Hawaiians were made from the beaten bark of *Broussonetia papyrifera*, also famous as a paper-stock. Similar lacy bark layers are found in the Australian flame tree (*Sterculia acerifolia*) and other species of this genus; and in nettle-trees (*Laportea; Trema*) of both Australia and India.

The leaves of screw-pines (*Pandanus utilis*) are plaited into coarse sacks, and the fibres otherwise employed, but the greatest source of basket material in the tropics and of fibre for innumerable purposes lies in the palm family, which is probably the most useful as well as picturesque of any in the equatorial zone. The foliage of the round-leaved species, when properly trimmed, becomes fans; others are torn into strips such as raffia, from Raphia, which are woven into hats, baskets and the like. The huge leaves of many serve as thatch for the slight tropical buildings. The stringy fibre of other species, like that of Mauritia flexuosa; of the tecuma palm (*Astrocaryum tucuma*); or that known as piassaba fibre derived from the extraordinary Leopoldinia piassaba and from Attalea funifera and still other species, is twisted into cordage or made into brooms and brushes. Kittool fibre comes from the jaggery palm (*Caryota urens*); and coir, woven into cocoa-matting and said to make the finest cables on account of its elasticity, lightness and durability under water, comes from the fibrous husks of the coconut (*Cocos nucifera*).

The dried kernel of the coconut palm is called copra and is one of the chief articles of export from the Philippines and other archipelagos of the Southern Seas, an important commercial oil being extracted from the desiccated flesh. Before the kernel has hardened at all the soft green husk is filled with a clear fluid, as pure and tasteless as water, which is the safest and most refreshing drink of the tropics. The husk is slashed with a heavy knife and the native pours the fluid down his throat directly from the nut. Oil is yielded by the fruits or nuts of other species, especially from those of the Cohune palm (*Attalea Cohune*), and from the more important African oil palm (*Elæis Guinensis*), yellow and violet scented, extensively exported for soap and candles. The small nuts of a stemless palm (*Phytelephas macrocarpa*) have white kernels that become so hard that they are used instead of ivory, the tree therefore being called ivorynut palm. Areca Catechu furnishes those fruits known as betel-nuts, chewed by Orientals with a bit of lime and betel pepper.

The twin nuts of the coco-de-mer (*Lodoicea callipyge*) found floating on the ocean, caused endless speculation among mariners who concluded that they were borne on a submarine palm, before the great trees were discovered in the Seychelles. Other palm fruits are the well-known dates from the cultivated Phœnix dactylifera, so important a food and article of export from Africa; those of several American species are sought for by the natives, especially the small bitter fruits of the mucuja (*Acrocomia lasiospatha*), and of the peach-palm (*Guilielma speciosa*). A favorite Brazilian drink was extracted from the macerated thin pulp of the tiny fruits of the graceful assai (*Euterpe oleraceæ*).

Not a few beverages, intoxicating or otherwise, are concocted from palm sap. In the Philippines, the fresh or mildly fermented sap drawn from the inflorescence of the coconut and nipa palm is called «Tuba»; wine and alcohol are made from the sap of the latter (*Nipa fruticans*). Filipinos also make wine, syrup and sugar from the burri, or talipot palm (*Corypha umbraculifera*), commercial sago furthermore being obtained from its soft pith. The chief source of that article, however, is Sagus. (The so-called sago palms (*Cycas*) are really members of the cycad family). A similar starchy food, and copious quantities of sap are produced by the East Indian wine palm (*Caryota uren*) the latter known as toddy, being a pleasant drink while fresh, but soon fermenting. When boiled it yields jaggery sugar, and when distilled, the beverage called arrack. Like products are obtained from the sugar palm (*Arenga saccharifera*) and other species. The wine palm of Africa is the jupati (*Raphia vinifera*).

Carnauba wax is shaken from the encrusted foliage of the wax palm of Brazil (*Copernicia cerifera*) sometimes used to adulterate beeswax; and another vegetable wax is scraped from the trunks of Ceroxylon Andicola of New Granada, where it is mixed with vegetable tallow for candles. Several palms are robbed of their terminal buds, so that they may be cooked as vegetables; hence they are called cabbage palms. One, the tall West Indian palm (*Oreodoxa oleracæa*), is a relative of the magnificent royal palm (*Oreodoxa regia*).

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HELEN INGERSOLL.

FORESTALLING, in criminal law, the buying of produce with the object of enhancing the price in open market, coming to market, or making any bargain for buying such goods before they shall be in the market ready to be sold, etc. This was an offense at common law and was the subject of frequent legislation. Modern conditions have made most such practices legitimate, but many abuses have arisen, under which come «corners,» or monopolies. The Sherman Anti-Trust Act forbidding under certain conditions the elimination of competition and restraint of trade is a modern attempt to prevent the abuses which have grown up about the system.

FORESTER, Frank. See HERBERT, HENRY WILLIAM.

FORESTERS, Ancient Order of, a fraternal order founded 1745, at Yorkshire, England. The order was introduced into the United States in 1832 by the establishment of Court Good Speed in Philadelphia. There are at present three high courts, and about 440 subordinate courts in the United States, with a membership of about 50,000. The total membership of the Ancient Order in all countries is about 1,600,000 members. It has courts in 36 countries, with reserve funds exceeding $50,000,000. Over $5,000,000 are disbursed annually in benefits. The revenue depends on fixed dues.

FORESTERS, The Independent Order of, was organized in 1874 at Newark, N. J. It was reorganized in Canada by the Hon. Dr. Oronhyatekha, a full-blooded Mohawk Indian of scholarly distinction, high character and great ability, who was educated under the patronage of the late king of England, in 1881. In 1881 the Society consisted of 369 members and was in debt. It now numbers 218,074 and has a surplus of $6,700,000 in its treasury, having already paid to widows and orphans of deceased brethren about $45,861,180. The membership extends throughout all of the provinces of Canada, nearly all of the States of the American Union, England, Ireland, Scotland, Wales, Norway, Denmark, France, Belgium, India, Newfoundland and Australia. The Society rejects a large percentage of applicants, being very careful in the selection of its risks. The order is governed by a supreme body, which meets once in three years. The local jurisdictions are governed by high courts of the various States and provinces. The funds, however, are all forwarded to the head office, there being invested under the insurance law of Canada which prevents investment in anything except first-class gilt-edge securities. The last reports show that no losses have ever been made in investments. The head office of the order is in Toronto, Canada, the building being a magnificent structure, known as the Temple Building, which was built and is owned by the order. In addition to the head office it contains a number of banks, loan companies, insurance companies, and is the headquarters of Masonry for the city of Toronto. The order disbursed in 1915 the sum of $3,950,032 to widows and orphans, and in sick and funeral benefits. The rates of premium may be judged from the following: Age 35; amount $1,000; mortuary premium $1.38 (small court dues in addition). All premiums cease at 70 years of age, or at any time when the members become totally and permanently disabled, at which time they are allowed to take in cash one-half of the amount of their policy, the balance to be paid to their heirs at death. After 70 years of age members are permitted to draw one tenth of their policy for each of 10 years if they live so long, the balance to go to their beneficiaries at death. The order also has a sick and funeral benefit division. It admits lady members, these being called companions, who are gathered in separate courts. Of its total membership of 218,074 about 20,000 are companion members.

FORESTERS OF AMERICA, a benevolent and beneficent order which had on 7 June 1916 a membership of 201,637. Its history begins with the institution of a "court" in Leeds, England, in 1790. The American period dates from the establishment of a "court" in Philadelphia in 1832. Up to 29 Dec. 1874 the order was under the jurisdiction of the English organization; but on that date a subsidiary high court was created in the United States, and on 15 Aug. 1889 the members of the latter seceded; a declaration of independence was read at the Minneapolis Convention, and the Foresters of America started as a purely and distinctively American organization. During the year 1915 the increase in membership was 19,863, and benefits paid amounted to $1,483,221.13. Since the organization was instituted, the expenditure (to 7 June 1916) for sick benefits, management, etc., has amounted to $42,099,148.26.

FORESTI, fō-rĕs'tē, **Eleutario Felice**, Italian patriot: b. Conselice 1793; d. 1858. He was graduated at the University of Bologna, studied law and practised his profession at Ferrara and became prætor at Crespino in 1816. Becoming a member of the Carbonari he was imprisoned from 1819 to 1836 and on his release came to the United States. He was professor of Italian at Columbia University for several years and became consul of the United States at Genoa in 1858. His publications included an edition of Ollendorff Italian grammar (1846) and 'Crestomazia italiana' (1846).

FORESTRY ASSOCIATIONS. In 1875, *The American Forestry Association* was formed at Chicago with the object of collecting and disseminating information on forestry and of fostering the conservation of the existing forests. This association was merged in 1882, into the American Forestry Congress, which became at once nationally influential in promoting the cause of forestry. In 1889 the original name was resumed. During the early years of its existence, the Association relied on annual reports, occasional bulletins, and the general press for the publication of information about forestry; but in 1897 it took over from the New Jersey Forestry Association the publication of the periodical *The Forester*, changing the title later to *Forestry and Irrigation*, *Conservation*, and, finally, *American Forestry*. *American Forestry* appears monthly and is one of the best forest periodicals in existence. The Association now has about 10,000 members, and is very active and influential in educating public sentiment and in shaping forestry legislation. Minnesota and Pennsylvania forestry associations were organized in 1876 and 1886, respectively; and for some years the latter's magazine *Forest Leaves* was the official organ of the American Forestry Association. Many State and local associations carry on similar work in various parts of the country. The Society of American Foresters, organized in 1900, is a professional society whose active membership is composed entirely of technically trained foresters of achievement. Its meetings and publications have contributed a great deal toward the solution of the forest problems of America. Under its auspices is published *The Journal of Foresty*, which was called until 1917 *The Proceedings of the Society of American Foresters*. Another class of associations of great importance in the preservation of the forest is the fire protective associations organized by timber owners in many States. Most of these are local in character; one State possesses 16 of them; in all, 43 have been formed in 13 States. In the Far West these protective associations are combined under one large organization, the Western Forestry and Conservation Association. They are in general a direct result of the work of the Government Forest Service, and side by side with it have been a powerful factor in bringing Federal, State, and private protective agencies together in close co-operation, in educating the public regarding the value of fire protection, and in shaping legislation for the reduction of the fire loss.

FORESTRY IN THE UNITED STATES. The purpose of forestry is to secure the perpetuation and at the same time the full use and benefit of the forest. Forestry seeks to serve the people by making the highest and most profitable use of large areas of land not well suited to agriculture, by conserving the water supply, and by fostering the economical production of wood commodities. The direct benefits to be secured from the practice of forestry are chiefly a continuous supply of wood for all its various uses and the even distribution of the water supply through protection of the watersheds. Conditions peculiar to the western part of the United States have made it necessary for government forest work to deal also with a very important use of the forest not directly pertaining to forestry, namely, the grazing of livestock on the national forests.

Forest Regions.— The problems of forestry and the methods employed in solving them are to a large extent determined by the nature, location, and extent of the forests themselves. The forests of the United States cover approximately 550,000,000 acres, or about 29 per cent of the total land surface. There are five great forest regions, three stretching from the Atlantic seaboard to the Great Plains, which are destitute of timber except along the margins of the streams and on occasional elevations, and two west of the Great Plains. (a) *The Northern Pine Forest* extends from western Minnesota eastward to the Atlantic Ocean and from Canada southward to northern Illinois, Indiana, Ohio, and New Jersey. From northern Ohio and New Jersey there is a gradually narrowing extension along the ridges of the Appalachian Mountains, taking in nearly all of Pennsylvania and West Virginia, western Maryland and western Virginia, and reaching as far south as northern Georgia. The characteristic tree of this forest is the white pine (*Pinus strobus*, Linn.).

White pine is a tree of the first commercial importance; and of all the trees of North America, it best combines the qualities of utility, rapid growth, heavy yield, and ease of management. Its former abundance and the cheapness and varied usefulness of its lumber made it an important factor in the development of the States in which it grows. After an enormous exploitation the original forests are now approaching exhaustion. The most rapid reduction has taken place in its western and more important centre of distribution; but the greatest bodies of white pine in the country are still to be found in the northern portion of the Lake States. The cut of white pine reached its maximum in 1890, when the production in Michigan, Wisconsin, and Minnesota amounted to 8,597,623,000 board feet. In 1900 the cut in these States had fallen to 5,419,333,000. In 1913, the total cut of white pine in the United States was 2,568,636,000 board feet. The reduction in cut has been accompanied by a marked fall in the quality of the lumber; and the large-size, high-grade white pine lumber, once abundant on the market, has become scarce and expensive. The demand for low-grade white pine lumber has made it possible, from a business standpoint, to cut and market second-growth timber when comparatively small and young. For many years the pine output of the northeastern States has consisted almost wholly of second growth. Had fires not been allowed to run repeatedly over the slash left in logging the original stand, a large part of northern Michigan and other noted white pine regions would probably now be covered with second growth, much of it of merchantable value.

Since the partial destruction of white pine in the eastern States, red spruce (*Picea rubens*, Sarg.) has become the principal commercial tree of this region. It grows usually in mixture with hardwoods, such as beech, birch, and maple. At high altitudes, however, there occur comparatively pure red spruce and balsam fir stands. The amount of spruce lumber sawed in Maine, New Hampshire, Vermont, Massachusetts, New York, and West Virginia in 1914 was 781,292,000 board feet, a large proportion of which was red spruce. Spruce is now cut principally for paper pulp; and the production of spruce pulpwood in the United States in 1911 amounted to 1,612,355 cords. This includes all the other varieties of spruce as well as red spruce. The cut of balsam fir lumber in the United States in 1914 was 125,212,000 board feet, more than half of the total being produced in Maine. Balsam fir has nearly always been cut to some extent along with spruce for pulpwood; and in 1911, the consumption of 191,779 cords of balsam fir pulpwood was reported. (b) *The Southern Pine Forest* has its northern extremity in southern New Jersey and thence widens out southward and westward until it reaches the Gulf of Mexico and the open country in Texas, Oklahoma, and Missouri. Its principal trees are longleaf pine (*Pinus palustris*, Mill), shortleaf pine (*Pinus echinata*, Mill), loblolly pine (*Pinus tæda*, Linn.), and bald cypress (*Taxodium distichum*, Linn.). The hardwoods of this region are chiefly the oaks, hickories, and gums. Longleaf pine is especially valuable as structural timber, and for this purpose is one of the most important trees in the world. The southern pines (known collectively in the lumber trade as southern yellow pine) supply a large proportion of the lumber cut of the United States. Out of a total of 37,346,023,000 board feet in 1914, southern yellow pine supplied 14,472,804,000 board feet. The southern pines, especially longleaf, also supply a large amount of turpentine and resin. In 1909 the value of these products amounted to $25,295,017. The bald cypress is a swamp tree of great commercial importance, especially for purposes requiring clear, durable, and easily worked lumber. The cut of cypress in 1914 was 1,013,013,000 board feet. (c) *The Central Hardwood Forest* occupies the territory between the southern and northern pine forests and stretches from the Atlantic Ocean to the treeless plains west of the Mississippi River. It is the only region in the United States in which the hardwoods predominate over the conifers. The principal trees are the oaks, hickories, ashes, chestnut, and yellow poplar. Many hardwoods are also to be found in the northern and southern pine forests, and much hardwood lumber is produced in the pine regions. The Central Hardwood Forest does not differ greatly in composition from the neighboring pine forests except in the comparative absence of the conifers. The hardwood lumber cut in the United States in 1914 was as follows: Oak, 3,278,908,000; maple, 909,743,000; red gum, 675,380,000; chestnut, 540,591,000; yellow poplar. 519,221,000; birch, 430,667,000; beech, 376,464,000; basswood, 264,656,000; elm, 214,294,000; cottonwood, 195,198,000; ash, 189,499,000; tupelo, 124,480,000; hickory, 116,113,000; walnut, 25,573,000; sycamore, 22,773,000. (d) *The Rocky Mountain Forest* extends along the Rocky Mountains from Idaho and Montana through Wyoming, Utah, and Colorado to Arizona and New Mexico. It is sub-arid in character and occupies more or less isolated mountain masses, separated from each other by grazing lands, deserts, or cultivable valleys, and from the Pacific Coast forest by desert areas. This forest is almost entirely coniferous, the principal species being western yellow pine (*Pinus ponderosa*, Laws.), Engelmann spruce (*Picea engelmanni*, Engelm.), lodgepole pine (*Pinus contorta*, Loud.), and Douglas fir (*Pseudotsuga taxifolia*, Lam. Brit.). In 1914 the lumber cut of western yellow pine was 1,327,365,000 board feet; and the cut of lodgepole pine, 18,374,000 board feet. On account of the semi-arid character of the region, this forest is of great value as a conserver of water; for all the vast irrigation projects situated nearby depend for their success upon the flow of water from the forested slopes of the mountains. It is in this forest that the summer range for grazing livestock is most important, the whole stock raising industry of the region depending largely for its summer feed on the ranges near or within the forests. (e) *The Pacific Coast Forest* occupies Washington, Oregon, and the northern half of California. The merchantable species are, with slight exception, conifers. The forest is characterized by the large size of the trees and the tremendous masses of timber it contains. The chief species are Douglas fir (*Pseudotsuga taxifolia,* Lam. Brit.), bigtree (*Sequoia washingtoniana,* Winsl. Sud.), sugar pine (*Pinus lambertiana,* Dougl.), western yellow pine (*Pinus ponderosa,* Laws.), western hemlock (*Tsuga heterophylla,* Raf. Sarg.), giant arborvitæ (*Thuja plicata,* Don.), and Sitka spruce (*Picea sitchensis,* Bong., Trautv. and Mayer). The forest of the California Sierras, characterized by the bigtree, the sugar pine, and numerous magnificent firs, is one of the most beautiful in the world. In 1914 the total lumber cut of Douglas fir was 4,763,693,000 board feet; of redwood, 535,199,000 feet; and of sugar pine, 136,159,000 feet.

Distribution of Stand.— The estimated total stand of timber in the United States is 2,800 billion board feet. Over one-fourth of this is located in the Pacific Northwest, in the States of Washington and Oregon. The adjoining region on the east in Idaho and Montana, known as the Inland Empire, contains a little over one-eighth and the State of California a little less than one-eighth of the standing timber of the country. Altogether, the Pacific and northwestern States contain over half the country's timber. About half the remainder is to be found in the southern pine States. Smaller portions, approximating one-twelfth and one-twenty-fifth of the total stand, are found in the northeastern and Lake States, respectively. The remainder is scattered.

The principal species composing this stand are: Douglas fir, found principally in Washington and Oregon, constituting a little over one-fourth the total; southern yellow pine (in reality consisting of shortleaf, longleaf, loblolly, and other pines, but usually sold and spoken of as «southern yellow pine»), found principally in the Gulf and South Atlantic States, aggregating about one-seventh of the total; and western yellow pine, found principally in the Pacific and southwestern States, about one-eighth of the total. No other softwood composes such a large proportion of the total stand as any of these, the next largest — spruce, which grows principally in the northeastern States and on the high mountain ranges of the West — comprising less than one-twentieth of the total stand. Although forming comparatively small portions of the country's total supply, other species such as redwood and sugar pine in California, western hemlock, western cedar, and spruce in Washington and Oregon, white pine in Minnesota and eastern hemlock in the Lake and northeastern States, compose a large portion of the local stands and are of importance in the regions where they are found. The hardwood species grow in the eastern half of the country, principally in the northern part, but constitute also a considerable proportion of the stand in the southern pine States. Altogether, they comprise about one-fifth of the total stand of the country.

The Forests of Alaska.— The southeast coast forests of Alaska, which occur along the streams and lower slopes of the mountains, are composed of large merchantable trees. The principal species are western hemlock, Sitka spruce, yellow cedar (*Chamæcyparis nootkatensis,* Lamb., Spach.), and giant arborvitæ. The vast interior forests contain chiefly small trees valuable for mining timbers, and are much injured by severe forest fires. The principal species are white spruce (*Picea canadensis,* Mill., B. S. P.), black spruce (*Picea mariana,* Mill., B. S. P.), paper birch (*Betula papyrifera,* Marsh.), and aspen (*Populus tremuloides,* Michx.).

Forests of the Philippine Islands.— The Philippine Islands contain about 49,000,000 acres of wooded land with an estimated stand of 123 billion feet of merchantable timber. There are about 750 species of valuable woods on the islands of which 160 are marketable. The lowlands and lower mountain slopes are occupied by the broad leaved trees, of which the banyan tree, and the bamboo, coco, and other palms are characteristic species; and the higher slopes, by the conifers.

The Forests of Hawaii and Porto Rico.— The Hawaiian and Porto Rican forests are both tropical, the large proportion of tropical hardwoods and palm-like trees being their distinctive characteristic. They are rich in species and are of great importance as a source of wood supply to the local population. Their greatest value, however, is for the protection of the watersheds of the islands.

History of American Forestry.— The first forestry legislation in America consisted merely of protective measures designed to preserve a certain kind of wood, such as oak for shipbuilding, or large straight pine trees for masts, or ordinances whose chief purpose was to secure the proper use of the timber that was cut. In 1699 a royal surveyor of the woods for New England was appointed, but his duties seem to have been merely the protection of the property rights of the different colonists in the timber of the forests. William Penn endeavored to establish a forest policy in Pennsylvania by requiring those who settled on the land to agree to leave one acre in forest for every five acres cleared. This plan, however, was apparently not adhered to.

After the Revolution, the forest legislation was much the same as it had been in colonial times. In 1799, the Federal government set aside $200,000 to buy standing timber for the navy. The act appropriating this money contained a provision for the protection of the timber for future use, and was followed by other acts of the same nature, most of them applying especially to the preservation of the live oak, which was particularly valuable for shipbuilding.

These early measures were probably without effect on the general timber supply. In fact, the timber laws were disregarded for the most part, and little effort was made to enforce them for the reason that the supply of timber seemed inexhaustible. And, indeed, this was pretty nearly true so long as no progress was made beyond the primitive methods of lumbering then used and the petty scale on which operations were conducted. With the development of sawmill machinery and modern methods of lumbering and the extension of railways, however, the destruction of the forests took on a new aspect. The lumber industry increased in proportions so swiftly and the forest disappeared, under the saw and the fires that followed in the wake of careless lumbering, at so rapid a rate that thinking men were finally aroused to the danger of the possible failure of the country's timber supply unless measures could be taken to protect and renew the forests. In 1873, the committee on forestry of the American Association for the Advancement of Science memorialized Congress on the subject and recommended the appointment of a commission of forestry.

Government Forest Work.— In 1876, an agency was established in the United States Department of Agriculture for the study of forest conditions in the United States, the consumption of wood, the probable future supply of timber, etc. This agency was held by Dr. Emerson B. Hough. In 1881, the agency became the Division of Forestry. In 1886, a professional forester, Dr. B. E. Fernow, was placed in charge; technical investigations were begun; and the results were published in bulletin and circular form, so that they became available to all who were interested in forestry. For a long time the Division of Forestry received an annual appropriation of less than $30,000, so that its activity was much restricted by lack of money. The field of work gradually expanded, however, and the division grew (1901) into the Bureau of Forestry, and finally into the Forest Service (1905) with an appropriation for the fiscal year 1915 of $6,007,461.24, of which about $4,750,000 was spent for the administration and protection of the National Forests.

National Forests.— In 1891, Congress authorized the President to set aside forest reserves, as National Forests were then called, in order to protect the remaining timber on the public domain from destruction and to ensure a regular flow of water in the streams. The first one — Yellowstone Park Timberland Reserve — was created by President Harrison that same year, and placed under the administration of the Land Office of the Department of the Interior.

Government administration of the reserves soon made apparent the necessity for scientific forestry. It was the duty of the Secretary of the Interior to prescribe regulations which would ensure the fulfilment of the objects aimed at in creating the reserves. Timber cutting must not destroy the forests, but must provide for the growing of a new timber crop. Grazing had grossly abused the range; it was necessary to devise methods for increasing the forage. Both timber use and grazing use must be so managed that water supplies would be maintained and bettered. All the resources of the forests needed to be given careful consideration and plans devised for their best development. Without such plans, little of the value of the forests could be made available to the people. Technical problems were involved which the officials of the Interior Department felt to be outside their province. They therefore at first requested the aid of the experts of the Department of Agriculture as advisers, and soon recommended the transfer of administration of the reserves to the latter department.

This transfer took place in 1905 and the Forest Service was put in charge of the work. The following year the name Forest Reserves was changed to National Forests, to indicate that their resources were not locked up as "reserves" for a distant future. In administering the National Forests the first aim of the Forest Service has been to protect their resources so that they will always be there to use, and at the same time to see to it that as many of the people as possible have an equal chance to use them.

There are now 152 National Forests with an area of about 155,407,920 acres, including the Alaska and Porto Rico forests. Within the forest boundaries are also some 21,179,035 acres in private ownership, consisting of lands granted or taken up for one purpose or another before the forests were created or of homestead entries made since.

Since the first establishment of the national forests the government has been carrying on a systematic stock-taking as the basis, from one standpoint, for systematic and regulated management. An immense area has already been covered, and the Forest Service will ultimately be in possession of fairly complete information regarding the amount of timber of various kinds on the forests and the conditions in each case which are important as having some bearing on the best method of utilization.

Ripe timber on the forests, of which there is a large amount, is sold at a fair price to the highest bidder. Anybody may purchase timber, but no one can obtain a monopoly of it or hold it for speculative purposes. The government is anxious to sell the mature timber on the forests because it is no longer growing at a profitable rate and should give way to young trees and seedlings. As few restrictions as possible are imposed upon purchasers of timber, only such as will ensure cut-over areas being left in the best condition for future growth. Experienced woodsmen estimate the quantity and quality of National Forest timber and its approximate value, as a basis for the price to be charged. In fixing this, all factors which affect the cost of lumbering, such as accessibility, number, and kind of improvements necessary, etc., as well as general market conditions, are taken into account. The prices asked allow the purchaser of National Forest timber opportunity for a fair profit. Attractive logging chances are made known to the public; and full information regarding them and the conditions of sale are given to inquirers.

The trees to be cut on a sale area are marked in advance by forest officers, the object being to make provision for a second crop of timber on the same land, unless the land is more valuable for agriculture. The method of cutting is always determined by technically trained foresters and in conformity with silvicultural principles; but the practical difficulties attendant on each operation are given full consideration. The system under which any particular forest is managed and under which the cuttings are done depends chiefly on the character of the timber and the main purpose for which the forest is managed. Timber on the watersheds of streams is never cut enough to impair the protective cover that the forest affords; for one of the chief objects of the National Forests is to regulate streamflow. Where the main purpose of the forest is timber supply, the system of cutting depends chiefly on the species present; and concessions made to the practical difficulties of the moment are equivalent in most cases to adopting a deferred cutting plan, by which ideal conditions for reproduction not secured at once will be made possible at the next cutting. In Douglas fir stands it is usually possible to secure more nearly ideal conditions for reproduction after a cutting operation than in the other types of virgin forest. The usual method with Douglas fir on the National Forests is to leave groups, strips, or single seed trees to reproduce the forest; the rest of the merchantable timber is cut clear. In western yellow pine and sugar pine stands, what might be called improvement cutting is usually practised; large, over-mature, and defective timber is cut and the medium-sized, thrifty, and younger classes are left. Where there is not enough young timber, the selection system is used in order to secure sufficient seed trees. In the mixed Douglas fir and larch stands of northern Montana and Idaho, a selection system is used, the large timber and all inferior timber being cut generally. Here, operations conducted to secure sawtimber amount to improvement cuttings. Operations producing hewn cross-ties and making use of smaller timber are permitted only where the conditions are such that no disadvantage can result. In the lodgepole pine stands, a selection system is used, but it is not the European selection system. In some stands, heavy thinnings and improvement cuttings are used; in others the straight improvement cutting is employed. In tie operations, the smaller sized timber is taken out only where no financial or silvicultural disadvantage is likely to result. As yet, spruce is cut comparatively little in the West because it is for the most part at too high altitudes. Where it occurs lower down it is taken out along with other species. In the National Forests of the East the general practice is to use improvement cuttings, both in the pine and oak of the Arkansas forests and in the hardwood and spruce of the Appalachians.

Small sales of timber are made by forest officers on the ground to avoid delay. Larger sales are made either by the supervisor of the forest, the district forester, or the forester, according to the amount desired. Small sales of timber for local use are encouraged. This is one of the ways in which the National Forests are made to serve the small lumberman and consumer. Though single sales have been made for as much as 800,000,000 board feet, over nine-tenths of the sales are for less than $100 worth of timber. Of the 10,905 timber sales made on the National Forests in the fiscal year 1915, 10,621 were of this latter kind. Homestead settlers and farmers may obtain National Forest timber for their own use at the actual cost of making the sale. No charge is made for the timber itself.

Sometimes natural regeneration of the forest fails and planting has to be resorted to. Furthermore, there are within the National Forests, and now bearing little or no tree growth, about 5,600,000 acres of land which are capable of producing valuable timber and are suitable for no other purpose. The Forest Service is planting these areas as rapidly as it can be done advantageously. Reforestation operations now cover from 12,000 to 15,000 acres yearly. Most of the land being reforested consists of old burns, where recurring fires have ruined the former forest. In selecting the sites for sowing and planting, preference is given to watersheds of streams supplying water for irrigation or municipal use, lands which will produce quick-growing and valuable trees, and regions where the supply of timber is not sufficient for local uses. Early attempts at reforestation often met with poor success; but after a great deal of experimenting, methods of collecting seeds, nursery practice, and methods of sowing the seed directly or planting seedlings or transplants raised in the government nurseries have been so improved that plantations are now established with good assurance of success. The best time for planting, the exposure most favorable to the species to be planted, and many other details which have an important bearing on the probable success of a plantation can now be determined with reasonable certainty. Eight experiment stations are maintained in the West, however, where investigations are being continued; and while denuded areas are being reforested in accordance with the principles already determined, new data are constantly being sought and the uncertainty that formerly attended planting operations is being done away with more and more.

Along with the timber on the National Forests, there is a great deal of pasture land, used at present by some 7,280,000 sheep and goats, and 1,725,000 cattle and horses every year, in addition to their natural increase. Local settlers and stockmen have the first right to the use of the range, and every man who grazes stock on the forests under permit is allotted a certain area for the grazing season. In this wa unfair competition between the big man and the little man, which in the old days worked so much harm, is done away with. A good supply of forage year after year is ensured by not allowing the land to be overcrowded with stock. Under regulation the range is improved, instead of being overgrazed and denuded, as has been the case with many of the outside public lands.

Mineral deposits within National Forests are open to development exactly as on unreserved public land. The only restriction is that mining claims must be bona-fide ones and not taken up for the purpose of acquiring valuable timber, or a town or power site, or to monopolize the water supply on stock ranges. Prospectors may obtain a certain amount of National Forest timber free of charge to be used in developing their claims. More than 500 mineral claims were patented within the National Forests during the fiscal year 1915.

Along the streams within the National Forests are many sites suitable for power development. These are open to occupancy for such purposes and have the advantage of being on streams whose headwaters are protected. The government does not permit the monopolization of power in any region or allow power sites to be held without prompt development. Permits for power development on the National Forests usually run for a term of 50 years, and may be renewed at their expiration upon compliance with regulations then existing. Such permits, while granting liberal terms to applicants, contain ample provision for the protection of public interests.

The total receipts from the National Forests on account of timber sales, grazing fees, and special uses, during the fiscal years 1912, 1913, 1914, and 1915, were as follows: 1912, $2,157,-356.57; 1913, $2,391,920.85; 1914, $2,437,710.21; 1915, $2,481,469.35.

It could not be expected, of course, that rugged, inaccessible mountain lands, such as constitute by far the greater part of the National Forests, would soon yield a revenue to the government over and above the cost of administration. Many of the forests are meant to supply the country's future needs, while others are chiefly valuable for watershed protection, which, though of the greatest importance to the people and industries of the country, does not yield the government a return in dollars and cents. In the case of almost every forest, moreover, a great deal of money must be spent for roads, trails, bridges, and telephone lines before the resources can be used. Nevertheless, 44 of the National Forests paid their local operating costs in 1914. Land more valuable for agriculture than for timber growing is excluded from the National Forests, so far as is possible, when the boundaries are drawn. Small tracts of land which cannot be thus excluded are opened to settlement under the Forest Homestead Act of 11 June 1906. Taken as a whole, however, the proportion of land within the forests more valuable for agriculture than for growing timber or other purposes is trifling. The greater part of the really valuable agricultural land within the forests has already been taken up, and most of what there is left has a severe climate and lies at high altitudes, often remote from roads, schools, villages, and markets. Therefore the chances offered the prospective settler in the immediate vicinity of the forests are far better than in the forests themselves.

Government Investigative and Co-operative Work.—Besides administering the National Forest, the Forest Service conducts a number of special investigations relating to the growth and management of forests and their utilization. It studies the characteristics and growth requirements of the principal tree species of the United States, in order to determine how different types of forests should be handled, and also the best methods of forest planting, both for the National Forests and for other parts of the country. At experiment stations maintained in connection with the National Forests, it investigates the scientific problems underlying the management of forests, and the relation of forests to streamflow and climate. It co-operates with the States in studying their forest conditions, with the object of developing forest policies adapted to their needs, and with private owners by furnishing advice concerning the best methods of managing and protecting their forest holdings. It also co-operates with States, under the terms of section 2 of the Weeks Law, in protecting from fire the forest cover on the watersheds of navigable streams.

One of the aims of forestry is to see that the products of the forest are put to their best use with the least waste. Through studies of wood uses the Forest Service aids the wood-consuming industries to find the most suitable raw material and to develop methods of utilizing their waste products. It also investigates methods of disposing of wood waste, collects statistics on the price of lumber at the mill and on the market, and studies lumber specifications and grading rules.

To carry out the idea still further, a forest products laboratory is maintained at Madison, Wis., in co-operation with the University of Wisconsin. Here, among other things, the physical, structural, and chemical properties of wood are studied. Studies are also made at the laboratory of seasoning and kiln-drying, preservative treatment, and the use of wood for the production of paper pulp, fibre board, etc., and in the manufacture of alcohol, turpentine, resin, tar, and other chemical products. Besides strictly forest investigations, the Service studies the life history and growth requirements of forage plants, in order that the National Forest ranges may be maintained in the best condition.

Forest Service Organization.— The work of the Forest Service is administered by the forester and associate forester, and is organized under the branches of operation, lands, silviculture, research, and grazing. A separate unit is charged with the acquisition of lands in the southern Appalachians and White Mountains under the Weeks Law. The branch of operation has general supervision of the personnel, quarters, equipment, and permanent improvement work on the National Forests. The branch of lands examines and classifies lands within the National Forests to determine their value for forest or other purposes, conducts all work necessary in connection with claims on the National Forests, and assists the chief engineer of the Service in all business connected with the use of National Forest lands for hydro-electric power purposes. The branch of silviculture supervises the planting, sale, and cutting of timber on the National Forests, and co-operates with States in protecting forest lands under section 2 of the Weeks Law. The branch of research has supervision over the investigative work of the Service, including silvicultural studies, studies of State forest conditions, investigations of the lumber and wood-using industries and lumber prices, and the work carried on at the forest products laboratory and the forest experiment stations. The branch of grazing supervises the grazing of livestock upon the national forests, allotting grazing privileges, and dividing the ranges between different owners and classes of stock. It is also charged with the work of improving depleted grazing areas and of co-operating with the Federal and State authorities in the enforcement of stock quarantine regulations.

Lands in the southern Appalachians and White Mountains are being purchased by the National Forest Reservation Commission, in accordance with the Act of 1 March 1911, commonly known as the Weeks Law, which provides for the acquisition of forest land on the watersheds of navigable streams. The Forest Service has been designated as the bureau to examine and value such lands as may be offered for purchase. Up to 1 July 1916, a total of 706,974 acres had been purchased and 578,753 acres in addition approved for purchase. These lands will be administered as National Forests.

In order to prevent delay and "redtape" in the administration of the National Forests, seven field districts, each containing approximately 26,000,000 acres of government forestland, have been established, with a district forester in charge of each. In each district office, assistant district foresters are in charge of operation, lands, silviculture, and grazing work in that district. Each National Forest (approximately 1,000,000 acres of forest land) is in charge of a forest supervisor, who is the general manager of his forest, planning the work and seeing that it is carried out. On forests where there is a particularly large volume of business the supervisor is assisted by a deputy. Every National Forest is divided into ranger districts (about 200,000 acres) with a district ranger in charge of each. Rangers perform the routine work involved in the supervision of timber sales, grazing, and free use and special use. They also help to build roads, trails, bridges, telephone lines, and other permanent improvements on the forests. For organization for fire protection on the National Forests see FOREST FIRES.

Forestry in the States.— There were many early laws on the statute books of various States aiming at fire protection or the encouragement of tree planting. Permanent State forestry work of importance was not begun, however, until 1885, when New York established a forest commission charged with the organization of a service under technically trained men to administer the State's forest reserve according to the principles of forestry. In the same year there were organized a Forestry Bureau in Ohio and a State Board of Forestry in California, and a forest commissioner was appointed in Colorado; after a brief period, however, and until they were reorganized, in Ohio and California in 1905 and in Colorado in 1911, all these were either discontinued or became inactive through lack of appropriations. In 1895 a commissioner of forestry was appointed in Pennsylvania. Except in New York and Pennsylvania the entrance of the States into the forestry field with permanent organization has been the direct outgrowth of the work of the National government. At the present time 32 of the States have forest departments, 24 employ professional foresters, and practically all have recognized the need of a State forest policy. The appropriations for the yearly support of State forestry departments vary from $500 to approximately $315,000. Some of the objects of State work have been to educate public sentiment regarding the value of State forest resources and the importance of their conservation, to give technical advice to private owners, to develop a systematic fire protective system, to provide planting stock for citizens, to secure the modification of tax systems so as to lessen the burdens of those who plant forests or otherwise endeavor to provide a permanent timber supply, and to establish State forests. The northeastern States have paid most attention apparently to the production of a new forest crop and have encouraged the practice of forestry by private owners to that end. Planting material has been provided, tax laws have been modified in several States, and technically trained foresters employed to give advice to applicants. Fire protection has also been supplied by State action, special attention being given to the protection of young growth. In the far West, the chief interest has been in protecting the vast supplies of mature timber from fire. Fire protection has had first place in the Lake States also, but here more attention is given to young timber than in the West. The South has been comparatively slow in adopting State forestry, though Maryland and North Carolina were among the first to have State foresters. The Weeks Law has greatly stimulated the organization of systematic State fire protective systems. Under this law the Federal government, through the Forest Service, co-operates with individual States in the protection of the watersheds of navigable streams. The Federal government contributes not more than half the cost (nor more than $8,000 in one year) of a State fire protective system established under this law. The government funds are used almost exclusively for the employment of lookouts and patrols. An area of about 13,000,000 acres is guarded at an average cost of about three-fourths of a cent an acre. Twenty-one States have entered into co-operative agreements with the government as follows: Maine, New Hampshire, Vermont, Massachusetts, Connecticut, New York, New Jersey, Maryland, Virginia, North Carolina, Kentucky, Texas, Wisconsin, Minnesota, Michigan, South Dakota, Montana, Idaho, Washington, and Oregon. New York maintains a State Preserve of 1,825,882 acres in the Adirondack and Catskill mountains; Pennsylvania has more than 1,000,000 acres of State forest, chiefly in the mountains of the central part of the State; Minnesota has 43,000 acres now in State forests and approximately 1,000,000 acres of school lands which are to be made into State school forests; Wisconsin has a reserve of 400,000 acres; Michigan, 589,000 acres; South Dakota, 75,000 acres (in the Black Hills); New Jersey, 13,720 acres; and New Hampshire, Vermont, California, Connecticut, Indiana, Massachusetts, and Maryland, from 2,000 to 9,000 acres each. The New York "Forest Preserve" is protected from fire, but it is not under forest management because the State Constitution forbids timber cutting on the reservation. The whole central portion of the Adirondack and Catskill mountain regions is protected from fire by a State ranger system. In Pennsylvania the State forests are under forest management, and the State maintains a ranger school at Mont Alto. The following States distribute planting material: Pennsylvania, Maine, New Hampshire, Vermont, Connecticut, Maryland, Kentucky, Ohio, Kansas, Michigan, Wisconsin, Minnesota, North Dakota, Idaho. In New York citizens are furnished tree seedlings from the State nurseries at cost. Taxes on timbered land may be levied chiefly on yield in Vermont, Massachusetts, Connecticut, New York, Pennsylvania, and Michigan.

Towns, cities, and counties, as well as the States, have begun to take an interest in forestry. In many cases it amounts to no more than the employment of a municipal forester whose business is the planting and care of street, roadside, and park trees. A number of them, chiefly in the older and more thickly settled portions of the country, have acquired forested tracts which they now manage for the protection of the community reservoirs or some other local purpose. There are over 130,000 acres of such forests in the United States, in tracts varying in extent from 40 to 25,000 acres.

Forestry by Private Owners.— The first example of professional forest management in the United States was begun in 1891 on the Biltmore Estate of Mr. G. W. Vanderbilt of Asheville, N. C., in a mixed forest of pine and hardwoods. To be sure, a large number of private owners had exercised care in handling their timberlands prior to this date. In some cases it was merely protection from fire; in other cases there was a rather crude selection of the trees to be cut, or grazing was restricted, or attempts were made to protect the young growth in logging. The Biltmore Estate, however, was the first to be managed in accordance with the principles of forestry. The work done on the estate was in the nature of an experiment to determine whether the introduction of forestry was practicable under the conditions obtaining in the lumber trade in the United States. The area under management was increased from the original 3,600 acres to 130,000 acres. Even in the first year, the forest work paid for itself and has been conducted successfully ever since. Most of this forest land has now been purchased by the government and is to become part of the national forest areas being established in the East. In general, the private owner of timberland has confined his efforts to fire protection, which is usually accomplished by means of associations such as have already been mentioned and by co-operation with the State and Federal governments. A number of private owners have practiced forest management profitably, however, since the Biltmore experiment. Conspicuous among these are wood pulp and paper manufacturers, who largely own the forests from which they get their logs. Because of the large investment in their mills and the impossibility of moving them to where there are new supplies of timber, these men are in many cases taking care of the young growth and limiting the cut to what the forests grow each year, thus insuring a permanent sustained yield. Of course, they also guard against fire, for that is the prerequisite to any successful forest management. The practice of forestry by pulp and paper companies is largely localized in New England and the Adirondacks. On several tracts in New Hampshire, Michigan, and New York, and on the forest lands of the University of the South at Sewanee, Tenn., forest management for the production of salable timber has proved successful. Abandoned farms in New England are often planted in timber and allowed to grow up from seed supplied by neighboring forests and are protected from fire and cut in short rotation for various uses. Several railroads are managing their forest properties for the production of a sustained yield of crossties. Many lumber companies are now employing technically trained foresters as a part of their woods force. This does not mean, of course, that they practice forestry; but it does indicate that the value to the lumberman of a technical knowledge and training is recognized. A large number of farmers and other small woodlot owners are now taking an interest in the proper cutting, protection, and reproduction of their timber; and in some of the States a part of the duty of the State forester is to assist farmers in the management of their woodlots. In the eastern States and the central hardwood region the woodlots are especially important. In the southern pine region and in the Douglas fir region of the Pacific Northwest fire protection is receiving more and more attention. In both of these regions second-growth timber is now being cut. On the whole, the practice of forestry by private owners is increasing but has become nationally important only in one branch — fire protection.

Forestry as an Investment.— Returns from timber raising are realized perhaps once or twice in a lifetime, hardly more often at best. The amount of capital required is large. In the practice of private forestry certain carrying charges like taxes, interest, and protection costs must be met annually, while the return on the investment must be deferred. Therefore, only long-lived agencies, such as the State and corporations and large capitalists, are able to engage in it with any certainty of profit. Furthermore, where capital and interest are mixed together in an investment, as is the case with an investment in forestry, the pressure of competition or the necessity of meeting fixed charges leads very readily to forced exploitation of the timber — in other words, to the uneconomic anticipation of the harvest. The element of time and the consequent temptation to private owners to turn from scientific management to mere exploitation makes it easier for the State than for even large capitalists to practice forestry. When the forests are owned by the public, the infrequent returns are of no disadvantage, while taxes and interest charges do not have to be met; and as a result of the assurance of stable ownership systems of management beneficial to the forest but requiring long periods of time may be undertaken with the certainty of success.

Technical Forestry.— In order to utilize the present forest most economically and profitably and at the same time to provide for a new growth which will produce timber and other forest products in the future, the science of forestry concerns itself with both forest management and forest production. *Forest production* comprises silviculture, forest protection, and forest utilization; *forest management*, the mensuration and valuation of forests, working plans, and forest policy.

The practical aims of *silviculture* are to secure quick reproduction after the removal of timber, to reproduce valuable species rather than those which are less marketable, to secure a large yield, to produce timber trees of good quality, and to secure the most rapid growth compatible with good stands and good quality. More broadly, silviculture has to do with the improvement of forest stands and with their establishment by natural reproduction or by artificial seeding and planting. Various so-called silvicultural systems which are adapted for use under certain conditions, are made use of for the accomplishment of these aims. These are known as the selection system, clear cutting systems, the shelterwood system, and the coppice system. In practice these are combined and modified in various ways. *Forest protection* is concerned with the protection of the forest against fires, animals, insects and fungi, and all other detrimental influences. In America protection against forest fires is the most important, although such pests as various kinds of beetles, white pine blister rust, chestnut blight, and mistletoe are common and have to be fought and guarded against. *Forest utilization* deals with the best methods of utilizing all classes of forest products. This involves putting different classes of material to the use for which they are best fitted, determining the proper season for cutting and logging, and the methods of transportation from the forest to the mill and from the mill to market. *Utilization* takes into account not only the timber but all the by-products, such as pasturage, tanbark, extract wood, firewood, naval stores, etc. For the calculation of the material standing on a given area, the yield to be expected, and the value of single trees or whole stands, methods of *forest mensuration* are employed based on the determination of the dimensions, age, volume, the increment of trees and forests. These also serve as a basis for calculating the effect of different methods of treatment of the forest. *Forest valuation* aims to determine the value of the growing stock in the forest and the value of the forest soil. It is based, of course, on the knowledge derived from silviculture and mensuration; and is usually expressed as expectation value (the present value of all returns expected less the present value of all expenses which will be necessary to obtain those returns), cost value, or sale value. These expressions are applied to the forest soil, the growing stock, and the rental of a forest property. Forest management accomplishes the objects of forestry by means of forest working plans, which are based upon all other knowledge which has been gathered regarding the forest. The character of the working plan depends upon the object for which the forest is to be managed, so that the working plans for forests with different objects would be entirely different. The working plan takes special cognizance of the fact that for every tree or forest there may be three different kinds of increment; that is, volume, quality, and price increment. It usually includes a detailed description of the stand, the topography and climate, cost of logging, fire hazard and means of protection, the market for the product, the unit divisions of the forest, known technically as compartments, the length of the rotation, the objects of the silvicultural system, the treatment of the different species, and the general object of the forest management. Detailed description of the means to be used in handling the forest such as maps, organization, etc., are also necessary.

American Practice.— In the practice of forestry in America the general principles of management worked out in Europe through centuries of experience are being taken up as rapidly as economic and other conditions permit. For many reasons, however, European practices cannot be adopted as they stand, but must be modified to suit American conditions. The use in America of forms of management different from those in vogue in Europe is made necessary by the highly developed and specialized methods and machinery of American lumbering, the extremely moderate price and enormous supply of low-grade forest products, such as firewood and the cheaper kinds of lumber, the difficulties attendant on getting out much of the timber, transportation facilities which make most places in the country much less dependent on the local supply than is the case abroad, the vast number of small holdings of forest land, and the high taxes on forest property. The fundamentals of American practice are protection from fire, conservative lumbering, and care of the young growth. American practice has not aimed to secure a sustained annual yield; nor to adopt as they stand European systems of cutting; nor to maintain permanent forces of laborers or permanent logging-road systems. The American forester has to deal with different species, as well as different conditions, and in a large measure is compelled to work out his own methods. In the cutting of timber generally, the method hitherto practised by the lumberman, with such modifications as will insure the perpetuation of the forest, is still adhered to. This method is the selection of the large and the defective trees and the inferior species for cutting, the young growth of preferred species being preserved during the logging operation and sufficient large trees being left to restock the area or to furnish protection for the young growth as the case may be.

Summary.— Forestry has made great progress in America in the last 15 or 20 years. During that time it has been built up from almost nothing to a point where it is recognized as being of vital importance to the continued prosperity of the country. The technical equipment and training of the American forester have been brought to a very high standard; many of the essentials of American practice have been worked out; great advances have been made in the study of conditions peculiar to America; and intensive and specialized investigations have been made of the problems of forest management and wood utilization. The investigative work of American foresters now bids fair to rival in accomplishment the work which has been under way in Europe for several centuries. In the 25 years since the first forest land was dedicated by the government to the practice of forestry, a tremendous advance has been made in the forest policy of the nation. In the beginning, the creation of the national forests met with much opposition, due chiefly to the ideas of speculation prevalent in the great timber regions of the West and to the fear of special interests that public ownership of the forests would interfere with their plans. This opposition has not died away altogether, and at times manifests itself strongly, but it no longer has any considerable popular support and no longer appears in open attempts to do away with government ownership. It is now reduced to indirect attacks on details of the forest policy. A national forest policy has been firmly established, based upon government ownership and control of a sufficient amount of forest land of the United States to assure a continuous and perpetual supply of timber. See FOREST FIRES; FOREST LAWS; FOREST SCHOOLS; FORESTRY ASSOCIATIONS.

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FORESTS, Petrified. Logs of trees petrified or replaced by silica and buried in sands and clays occur in various geological formations in many parts of the world. Probably the most notable occurrence of this kind is the petrified forest in northeastern Arizona. This forest or series of forests lies 9 to 16 miles south of Adamana, a small station on the Santa Fé Railroad. They are so remarkable that in 1906 they were made a National Monument by President Roosevelt and placed in charge of a keeper under control of the Department of Agriculture. The trunks are all prostrate and mostly broken. They were of *Araucarioxylon arizonicum*, now extinct but related to the Norfolk Island pine, and existed in Triassic time. They grew near by and after falling drifted down a water course, lodged in some eddy, and were finally deeply buried by sand and clay. The conversion to stone was effected by gradual replacement of woody matter by silica deposited by underground water. A small amount of iron has given the beautiful brown, yellow and red tints for which this “wood” is noted. In thin slices under microscope the original cell structure of the wood is beautifully distinct. Some of the trunks are six feet in diameter and more than 100 feet in length, one forming a small natural bridge, the clay having been washed out beneath it. Some logs are in place where buried, but most of them roll down slopes as the sand and clay is washed away. Petrified wood occurs at other places in Arizona and New Mexico, and there are many trunks, some upright, in the eastern part of the Yellowstone Park. See Palæobotany.

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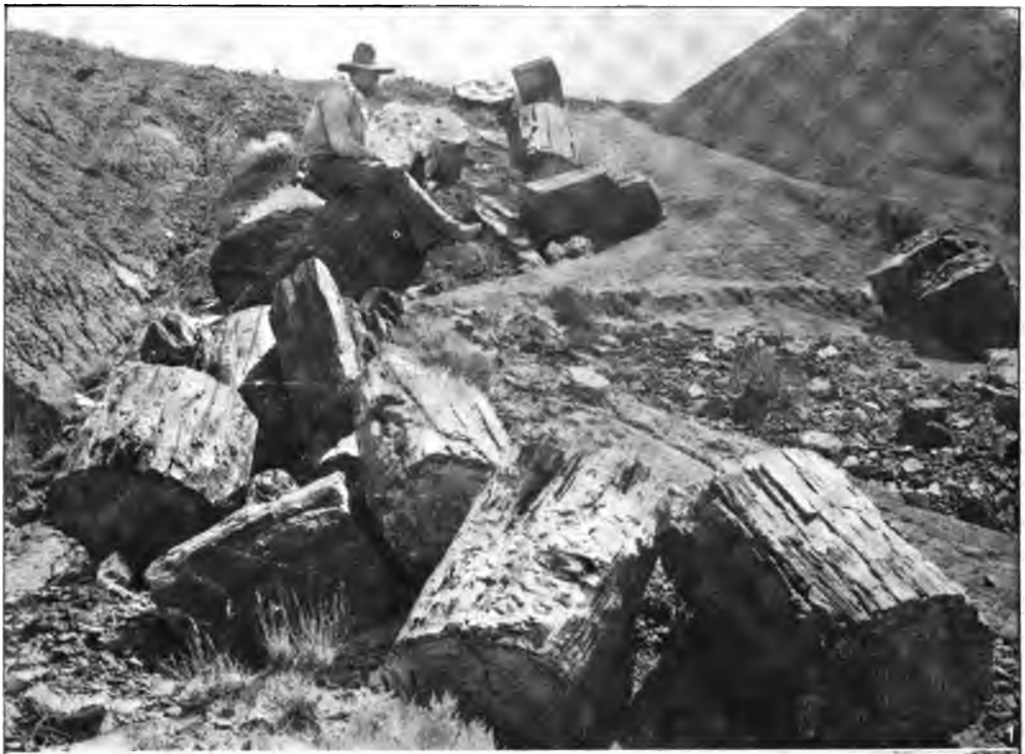
FOREY, Elie Frédéric, ā-lē frā-dā-rik fō-rā, French military officer: b. Paris, France, 10 Jan. 1804; d. there, 20 June 1872. He took part in several Algerian campaigns as well as in the Crimean and Sardinian wars, and when the expedition to Mexico was decided upon in 1861, Forey received the command of the French troops. After several sanguinary engagements, he attacked and stormed the strong post of Puebla, thereby throwing open the road to the city of Mexico. For this service he was made marshal of France.

FORFAR, fôr'fẽr, Scotland, a municipal borough and capital of the county of Forfar, at the east end of Loch of Forfar, 13 miles northeast of Dundee. It contains a courthouse, county hall, town hall, the Meffan Institute, an infirmary and Reid hall. The principal industries are linen and jute manufactures, brewing, tanning, rope-making, and iron-founding. The parliaments of Scotland once met within the walls of the old castle of Forfar. It was made a burgh by David I in the 12th century, was burned down in the 13th, and thereafter dwindled to a country village. Witches were persecuted in Forfar, and there is shown in the county hall a witches' bridle, a gag used to prevent them from speaking whilst being led to the place of execution. Pop. 12,254.

FORFARSHIRE, or ANGUS, Scotland, an eastern maritime county, bounded north by Kincardine and Aberdeen, west by Perthshire, south by the Firth of Tay, and east by the North Sea. Its area is 873.7 square miles. The island of Rossie and the Bell Rock belong to Forfar. Its surface is irregular and hilly. The Sidlaw Hills and the Binchinnin

PETRIFIED FORESTS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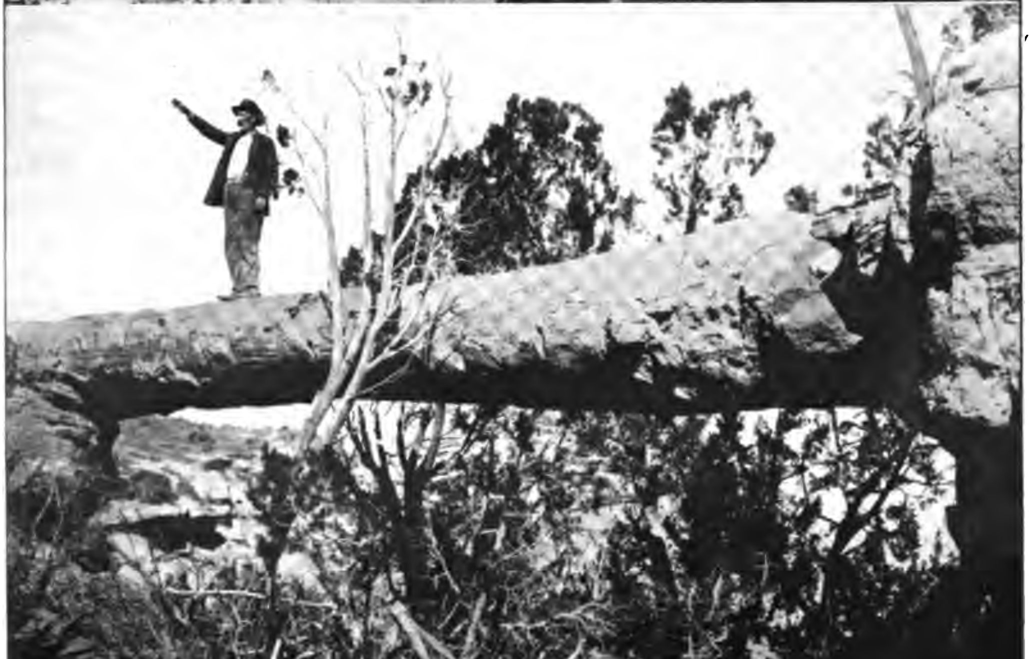
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1 Group of Petrified Log Sections, Petrified Forest, South of Adamana, Arizona
2 Natural Bridge, Petrified Forest, South of Adamana, Arizona, formed by a petrified tree

group are the most important. None of the rivers is navigable, and only three are of any importance, the Isla and the North and South Esks. The largest lakes are the Loch of Forfar and Loch Lee. The climate is healthful and favorable to agricultural pursuits. Wheat, barley, oats and potatoes are the principal crops. Sheep and cattle are raised in large quantities. Jute and flax manufactures are the county's principal industries. Shipbuilding is also carried on, as are also manufactures of soap and chemicals, leather, machinery, etc. Sandstone quarries and the deep sea fisheries employ many hands. The chief towns are Forfar, Arbroath, Brechin, Broughty Ferry, Dundee and Montrose. Pop. 281,417, of whom about 1,200 speak Gaelic. Consult Jervise, A., 'Memorials of Angus and Mearns' (Edinburgh 1895), and Warden, 'Angus or Forfarshire' (4 vols., ib. 1880–83).

FORFEITURE, fôr'fit-ūre, a legal penalty, by which an owner is absolutely deprived of his property for crime or other unlawful act. This applies to personal as well as real property, and forfeiture may be a decree of civil as well as criminal courts. The penalty is of feudal origin. The lord owed protection to the life and property of the vassal; the latter owed fealty and service to his lord. When the vassal failed to yield these, he lost the shelter of the law, became an outlaw, and incapable of holding property. Loyalty to the feudal relation being the condition on which life and property were secured to him, when he failed in loyalty he had no longer any claim on life or property.

Treason was punished by forfeiture long before the Norman Conquest in 1066. After that period forfeiture became the ordinary penalty for felony, which was styled petty treason; while treason or disloyalty in regard to the sovereign was called high treason. Forfeiture was accompanied by what was styled corruption of blood. This was the sentence of legal bastardy passed on the offender so that he could neither inherit nor bequeath property.

Felony in the United States has never been considered ground for forfeiture. The Federal and State laws have modified all precedents in the matter of forfeiture, which they restrict within very narrow limitations. (See ATTAINDER). During the War with Germany there was frequent agitation in the United States for the forfeiture of German property in this country. The German ships in Hoboken were seized by the United States government and put into service; they were not, however, forfeited to the stockholders.

In England civil forfeiture may be incurred by tortious alienation, by wrongful disclaimer, by alienation in mortmain (see MORTMAIN), by breach of condition, and by the commission of waste. (See WASTE). In Scotland civil forfeiture may arise either from statutory enactment, at common law, or by agreement. In the United States civil forfeiture is only imposed for acts of waste committed by tenants for life or years, or for breach of contract in violating the conditions on which lands were granted. Some States have abolished even this degree of forfeiture. By particular statutes enacted by Congress smuggling, or importing goods on fraudulent invoices involve confiscation, and forfeiture of the entire invoice (see INVOICE), or the balance wrongly imported. Piracy has always entailed confiscation or forfeiture of the piratical craft.

FORGE, FORGING and FORGING MACHINES. A forge is a furnace or open fireplace, having a forced draft, for heating metals, especially iron and steel, to be shaped by hammering or pressure. Previous to the 19th century, most iron work was forged by smith on anvils. The coal used now is usually soft, and is sometimes termed blacksmith's coal. Portable forges are made for light work, and a common form of these has four legs made of iron tubing, a shallow bowl to hold the coal and contain the fire, and a hood above. At the rear is a small rotary fan, operable by a wheel-crank. As forges increase in size and capacity, they develop into what are more properly called furnaces, such as the immense heating furnace of a steel works. In forging iron by hand the smith thrusts the metal into the centre of his fire, and its color tells him when it is ready to be worked. As it heats, it becomes black red, then a low red, then bright red, then a white heat, and if the heating continues it next begins to burn. If the smith desires the iron to be very soft, that it may yield quickly to his blows, he lets it come to a white heat, then takes it with his tongs on to his anvil, and begins to hammer it rapidly into the desired shape. Often a helper stands by to strike blows alternately with the smith, in order that as much hammering as possible may be done before the iron cools to a point where it requires reheating. Long practice makes very expert smiths, and many of them will shape a bar of iron into intricate form in a surprisingly short space of time. When the smith desires to weld together two pieces of iron, he must heat both pieces at the same time to a uniform white heat. As the iron approaches a white heat he throws sand on it, which, if done at the proper temperature, adheres and melts, forming a liquid glass-like fluid that flows over the surface of the iron and keeps the air from it, thus preventing its burning. If the ends of two bars are to be welded, each is first brought to a flat point, so that there will be considerable surface to weld together. After the surfaces adhere, the weld may be reduced by reheating and hammering down to the size of the other portions of the bars. When pieces are joined end to end, this is termed a butt-weld, which is not apt to be as strong as a lap-weld. Where forgings are so large that a smith and helper cannot work them satisfactorily, because there is too much and too heavy hammering to be accomplished in the short time the metal retains its great heat, the machine hammer is resorted to. This was made in various forms, and was an important tool during the early part of the 19th century, finding its culmination in the great steam-hammer of Neysmith, which was devised especially for such large forgings as the shafts of paddle-wheel steamships, then coming into use. The trip-hammer and the steam-hammer were the chief tools used for large forgings until about 1890, when the hydraulic press began to supersede the hammer for large work. About 1884, when the United States government began to seriously take up the rebuilding of the navy, and the construction of steel battleships and cruisers, there came a demand to American manufacturers for very large forgings, which had not previously been produced here. The forges of that date were equipped with power hammers, of a capacity suited to welding wrought iron into forgings of moderate size. The introduction of steel rails taught American iron manufacturers that steel forgings were desirable in all classes of machinery as greatly reducing the size of the parts, because of the increased strength.

The hydraulic compression system of forging, which was introduced in America when our steel plants were called upon to provide the large forgings for the navy, has met with general approval, and is steadily increasing in use. It has been demonstrated that forgings made by hammering were subject to all sorts of internal strains due to differences in compression and differences in cooling. When such a forging is cut, as for making a keyseat, a distortion of form follows as the result of certain strains that have been relieved. A large forging requires a pressure great enough to penetrate to every part of the mass of metal, so that the flow of metal resulting shall take place uniformly throughout. Such a flow requires time and a pressure that cannot be obtained by a quick hammer blow, and a series of blows does not produce the same effect as does the persistent pressure of the hydraulic forging machine. Fluid steel begins to crystallize at the point where the degree of heat is reduced so that it solidifies (about 2,600° F.), and the more slowly it is cooled from this point downward, the larger will be the crystals of the ingot. Forging during the cooling tends to check crystallization, just as stirring water at a temperature below the freezing point would check the formation of ice crystals. The more irregular the method of forging is, as in the case of hammer blows, the more it interferes with an even crystallization. The pressure system not only interferes much less than hammering, but forgings are farther improved in modern practice by reheating above the recalescent point, which is between 1,200 and 1,300° F., depending on the percentage of carbon and annealing to secure a new crystallization, and oil tempering.

An examination of the grain or fibre of hydraulic forgings shows that the steel tends to arrange itself in layers following the outer contour of the piece of metal, thus securing the most strength. A sharp angle in the pattern will tend to cut off the flow of metal, and if such is required, the method is to round out the place in the forging, to secure the best flow of metal, and then machine off the surplus later.

To avoid internal strains as much as possible such large forgings as steamship shafts are preferably made hollow. That is to say, the cylindrical ingot from the furnace after cooling is bored through the centre, mounted on a steel mandrel, heated and forged by compression. Ingots produced with fluid compression are well adapted to being bored and hollow-forged, and this method produces the most perfect forgings. These large forgings are subjected to a hydraulic pressure of about 7,000 pounds to the square inch, which pressure is maintained while the mass slowly cools. Shafts of more than a foot diameter are best bored, as the bore hole not only assists uniform heating, but gives opportunity for inspection.

As the art of forging advanced, small forgings of iron, steel and other metals were commonly produced by drop-forging. A press containing a top and bottom pattern (die and counter) received the roughly shaped hot metal, and at one or more blows it was brought to the desired shape. This method has been improved upon by the use of pressure, as developed in forging machines which accomplish, on a smaller scale, work similar to hydraulic forging presses. See MACHINE FORGING; BELLOWS; FURNACE; HAMMER; IRON; PRESS; STEEL; WELDING.

CHARLES H. COCHRANE,
Author of 'Modern Industrial Progress.'

FORGERY, the fraudulent making or alteration of a writing to the prejudice of another man's rights, or making of any written instrument for the purpose of fraud and deceit; the word *making,* in this last definition, being considered as including every alteration of or addition to a true instrument. The offense of forgery may be complete though there be no publication or uttering of the forged instrument; for the very making with a fraudulent intention, and without lawful authority, of any instrument which, at common law or by statute, is the subject of forgery, is of itself a sufficient completion of the offense before publication. Most of the statutes, however, which relate to forgery make the publication of the forged instrument, with knowledge of the fact, a substantive offense. Motive has everything to do with deciding forgery. To endorse another's name on the back of a check in order to steal the money is forgery. Yet it is not uncommon for a business man to sign on a check the name of another and his own immediately below, thus assuming the responsibility for collecting the money. He is considered justified in doing this to meet the bank's rules for cashing checks, and no forgery is committed where none is intended. A deed forged in the name of a person who never had existence is forgery at law. A writing is forged when a person drawing up a will for an invalid inserts legacies therein falsely. It is not material whether a forged instrument be drawn in such manner that if it were in truth that which it counterfeits it would be valid. The punishment of forgery at common law is, as for a misdemeanor, by fine, imprisonment, and such other corporal punishment as the court in its discretion might award. The penalty varies in different States, in some the statutes having been much enlarged to include acts which were not punishable formerly as forgery. The punishments ordained for the offense by the statute law in England were once, with scarcely an exception, capital.

FORGET, fôr-jā', **Amédée Emmanuel,** Canadian statesman: b. Marieville, P. Q., 1847. He received his education at the College of Marieville, was admitted to the bar in 1871, and entered on the practice of his profession in Montreal. After some years he removed to the West and was appointed private secretary to the lieutenant-governor of the Northwest Territories in 1876, and clerk of the assembly at Regina in 1888. He afterward served as assistant commissioner of Indian Affairs for Manitoba and Northwest Territories, was member of the council of public instruction of the

Northwest Territories after 1893, Indian Commissioner from 1895 to 1898 and lieutenant-governor from 1898 to 1905. In the latter year he became lieutenant-governor of Saskatchewan and was elected to the Dominion Senate in 1911.

FORGET, Jacques, Belgian clergyman and author: b. Chiny, Belgium, 6 Jan. 1852. He was educated at the seminaries of Bastogne and Namur and the University of Louvain. He studied Semitic languages in Rome, Beirut and Berlin and was ordained to the priesthood in 1876. In 1885 he was appointed professor of Arabic language and literature at Louvain, and in the following year was appointed to the chair of dogmatic theology at the same institution. He was president and founder of the African Seminary for missionaries to the Congo in 1886–89 and was made honorary canon of the cathedral of Namur. He took part in the International Congress of Catholic Scholars at Brussels in 1895, the International Congress of Orientalists at Algiers in 1905, the International Congress of Apologetics at Vich 1910. He published ‘De vita et scriptis Aphraatis’ (1882); ‘Le Liban’ (1887); ‘Ibn Sinā, le levre des théorèmes et des avertissements’ (1892); ‘Les missions sous le pontificat de Léon XIII’ (1888); ‘Principes de philosophie morale’ (1906); ‘Le concile du Vatican’ (1906); ‘Les conciles oecuméniques’ (1910); ‘Synaxarium Alexandrinum’ (2 vols., 1909, 1911); ‘La valeur historique du quatrième évañgile’ (1911). He was director of the Arabic section of ‘Corpus scriptorum christianorum orientalium’ and collaborated in Jaugey ‘Dictionnaire apologetique’; Vacant-Mangenot, ‘Dictionnaire de théologie catholique’; ‘The Catholic Encyclopedia,’ etc. He is a contributor to the *Revue néo-scolastique, Le Moyen Age, Revue Apologétique,* etc., etc.

FORGET, Sir Joseph David Rodolphe, Canadian capitalist: b. Terrebonne, P. Q., 10 Dec. 1861. He was educated at Masson College, Quebec, engaged in business, entering the Montreal Stock Exchange in 1890. He amassed great wealth and is a director of a great number of corporations in the financial and industrial fields. He founded La Banque Internationale du Canada in 1911, of which he became president. In 1904 he was elected to the Dominion House of Commons as an Independent Conservative and seven years later declined a portfolio in the Borden Cabinet. He was knighted in 1912.

FORGET-ME-NOT, popular name of the small annual or perennial herbs of the genus *Myosotis* of the order Boraginaceæ. It is represented by a number of species in Europe, North Asia, North America and Australia. The most common species are *M. scorpioides, M. laxa, M. sylvatica, M. Azorica, M. versicolor,* and *M. virginica.* The flower is a favorite with poets, and is the symbol of constancy. According to tradition it received its name from the last words of a knight who was drowned in an attempt to pluck the flower for his lady.

FORK, an implement formed of two or more prongs fastened to the end of a shaft or handle. On the farm the fork is a familiar implement used for pitching hay, manure, crops, etc., and for digging and preparing the soil for crops. The most familiar type of fork is the table-fork for use in eating. For the development and use of the table-fork consult La Croix, Paul, ‘Manners, Customs and Dress during the Middle Ages’ (London 1874) and Sumner, G., ‘Folkways’ (New York 1907).

FORLI, Melozzo da, mā lōts'ō dā fōr lē, Italian painter: b. Forli, about 1438; d. 1494. He was the first who applied the art of foreshortening to the paintings of vaulted ceilings. About 1472 he painted the ‘Ascension’ in the great chapel of the Santi Apostoli at Rome for Cardinal Riavio. In 1711, when the chapel was being rebuilt, this painting was cut out of the ceiling and placed in the Quirinal palace, where it still remains.

FORLI, for'lē (*Forum Livii*), Italy, town and capital of the province of the same name, 40 miles southeast of Bologna, on the River Montone. Its churches and picture gallery contain works by Alessandro dei Bigni, Palmezzano and other eminent artists. The old citadel now serves as a prison. There are a lyceum, town hall, seminary and technical school, a library, and a hospital. There is a good trade in grain, live stock, and wine and there are manufactories of machinery, hats, silk goods, pottery and furniture. In the 12th century Forli was in league with Ravenna. It surrendered to Martin IV in 1282. It was taken by Caesar Borgia, but in 1504 became a part of the papal states. Pop. 45,994. Consult Baedeker, ‘Central Italy’ (latest ed., Leipzig 1909).

FORM, *in philosophy,* a term used (1) objectively, to denote the assemblage of qualities which makes a thing what it is. Only the essential and permanent is considered, the accidental or adventitious being disregarded. The word is employed also (2) subjectively, to express the idea which the mind may supply of a figure or object, as distinguished from that object in itself. In this sense it is peculiar to the philosophy of Kant, who postulated two such ideas, namely space and time, supplied to the object by the mind through the operation of experience.

In botany, the term used to designate the unit of ecology, as that division of the study which treats of the relations existing between plants and their environments is now called. The word is frequently met with in such combinations as «form of vegetation» or «plant form.» See BIONOMICS; PLANTS, DISTRIBUTION OF.

In music, that theory in the general art of composition in accordance with which themes, tonalities, phrases and sections are so arranged as to obtain a correlated and symmetrical whole. The principal three recognized forms are those of the *lied, rondo* and *sonata.* These admit of numerous variations. In so-called cyclical forms, as, for example, the symphony, the necessary correlation and symmetry is secured by the relation of the movements as to proportion and key, the succession of various tempi, and sometimes also the employment in one movement of a theme previously used in another.

FORMA PAUPERIS, fôr'mạ pâ'pėr-is, **In,** signifying — in the character of a poor person — is the legal term both in Great Britain and the United States for suits carried on by individuals who are too poor to pay the usual fees. As early as the reign of Henry VII a statute provided that anyone taking oath that he was not worth £5 beyond his wearing-apparel and the subject in dispute, was entitled to have writs, according to the nature of the case, without paying fees, and the judges were to assign him counsel and attorney who should act gratuitously. This indulgence is granted to plaintiffs only at common law, and is granted to defendants only in prosecutions. A plaintiff must have a counsel's certificate of a good cause of action, and an affidavit of the party or his attorney must be laid before court that the case contains a full and true statement of material facts. A person admitted to sue *in formâ pauperis* is not entitled to costs from the opposite party, unless by order of the court or of a judge. In several states of the United States the provision is governed by statute, while in others it is considered part of the common law.

FORMA URBIS ROMÆ, a map of ancient Rome executed in marble and placed on the wall of the Templum Sacrae Urbis, now the church of Saints Cosmus and Damian. From 1559 to the present time excavations have brought to light about 600 pieces of this Marble Plan, as it is known. All the pieces are housed in the Capitoline Museum. It represented the city after the reconstruction by Severus and Caracalla, and is of the greatest interest to archæologists in identifying existing ruins. Consult Platner, 'Topography and Monuments of Ancient Rome' (2d ed., Boston 1911).

FORMALDEHYDE. See Bactericide; Disinfectants; Fumigation.

FORMALIN, a solution produced by dissolving in 60 to 70 per cent of water 30 to 40 per cent of formaldehyde gas, CH_2O. This solution has come to be recognized as a powerful disinfectant. Dr. Charles C. Barrows was among the first to employ formalin as a specific for sepsis or blood poisoning. About 500 cubic centimeters of formalin solution was forced into a patient's circulation. The temperature fell almost immediately and the pulse showed an instantaneous improvement. The day after another injection was made and examination showed that bacteria were no longer present in the blood. A third injection into the patient's left arm introduced 750 cubic centimeters into the circulation. The temperature fell to normal, no more bacteria were developed and the patient recovered rapidly. Since then formalin, as a 37 per cent solution, has won extended use as a germicide, disinfectant and preservative, though the latter use is regarded as injurious. It is compounded with gelatin as a local antiseptic.

FORMAN, Justus Miles, American novelist: b. Le Roy, Genesee County, N. Y., 1 Nov. 1875; d. 7 May 1915. In 1898 he was graduated at Yale University, thereafter went to Europe, where he studied painting for three years. He published very many short stories in magazines up to the time of his death on the *Lusitania*. His works in book form include 'The Garden of Lies' (1902); 'Journey's End' (1903); 'Monsigny' (1904); 'Tommy Carteret' (1905); 'Buchanan's Wife' (1906); 'A Stumbling Block' (1907); 'Jason' (1909); 'Bianca's Daughter' (1910); 'The Unknown Lady' (1910); 'Court of the Angels' (1912); 'The Opening Door' (1913); 'The Blind Spot' (1914); 'The Six Rubies' (1914).

FORMATES. See Formic Acid.

FORMATION. See Ecology; Plants, Distribution of.

FORMATION, in geology, a term used of groups of rock, whether stratified or unstratified, having a similar origin or character. Thus it is usual to speak of a limestone, a sandstone or a clay formation. The word has also been by some extended to be synonymous with system, or to denote a group of strata of the same age, as Canadian series, Carboniferous system, etc. By the United States geological survey, the term is used to indicate a group of rocks mapped as a single unit, that is, given one color on a geologic map.

FORMENTERA, for-men-tā̆'rạ, Spain, one of the Balearic Islands, in the western Mediterranean, off the coast of Spain, in the province of Baleáres. It has an area of 38 square miles. Fishing and salt-making are the principal industries. Wheat is the chief crop and cattle are raised in considerable numbers. Pop. 2,600.

FORMIA, Italy, city in the province of Caserta, on the Gulf of Gaeta, 65 miles north of Naples. It was long known as the Mola di Gaeta but resumed its ancient name. It commands several splendid views and, lying on the ancient Via Appia, it was a favorite resort of wealthy Romans. There are numerous remains of ancient villas along the coast and on the slopes above the city. The sheltered hillsides are covered with lemon, orange and pomegranate gardens. The ancient Formiæ was a town of the Volsci and in 332 B.C. received the *civitas sine suffragio* from Rome. It received full citizenship in 188 B.C. Cicero owned a villa near Formiæ and was murdered in the neighborhood. Pottery and oil are the only manufactures. Pop. 8,734.

FORMIÆ. See Formia.

FORMIC ACID, a monobasic organic acid having the formula CH_2O_2, or H.COOH, the final H in the last of these formulæ being the one that is replaced when the acid combines with bases to form its salts (which are known as «formates»). It is an important substance in organic chemistry, and may be obtained by the oxidation of methyl alcohol, as well as of starch, sugar and other organic substances. The most convenient method of preparing the acid is by heating anhydrous glycerin with crystallized oxalic acid. The reaction is not a simple one, monoformin being one of the intermediate products; but the obvious part of the reaction is that the oxalic acid is converted into formic acid with liberation of carbon dioxide. Pure anhydrous formic acid is a pungent, colorless liquid, boiling at about 212° F. at ordinary atmospheric pressure (its vapor burning with a bluish flame), and freezing at about 47° F. into a white crystalline mass. Formic acid is completely resolved by strong sulphuric acid into water and carbon monoxide, $H.COOH = H_2O + CO$. It reduces Fehling's solution (q.v.), and also reduces gold and platinum to the metallic state, from their solutions. When boiled with the nitrates of silver and mercury, formic acid precipitates these metals in the form of grayish metallic powders. Formic acid is a strong reducing agent and a powerful antiseptic; both the acid and its salts are used as disinfectants and preservatives. It is also used in dyeing. The acid takes its name from the fact that it exists, in the free state, in the bodies of red ants (*Formica rufa*), from which it may be obtained by crushing the ants and distilling the mass with water.

FORMICA, fôr-mĭ'ka; **FORMICIDÆ,** fôr-mĭs'ĭ-dē, the genus and family respectively which contain the typcial ants. See ANT.

FORMICARIIDÆ, fôr"-mĭ-ka-rī'ĭ-dē, a family of small, tropical American birds, the so-called «ant-birds.» They are numerous in genera and species, are related to the tree-creepers and plant-cutters, and frequent forests and thickets, flying badly from the shortness of their wings and consequently feeling most at home on the ground, where they devour beetles, spiders and insect larvæ and berries, but are not known to eat ants at all. The nests are usually made in low bushes. They wear sober colors, as a rule, and the sexes are similar.

FORMIGE, fŏr-mē-zhā, **Jean Camille,** French architect: b. Bouscat, Gironde, 1845. He was a pupil of Laisné, and received from the French government a commission for a series of plans for, and restoration of, public structures; the latter including the Roman theatre at Orange, Vaucluse. He executed decorations in the Paris Hôtel de Ville, became architect of Paris streets and parks in 1885, built the Liberal Arts and Fine Arts buildings at the Paris Exposition of 1889, and the buildings of the Rumanian government at that of 1900. He was made an officer of the Legion of Honor and also of the Academy.

FORMING MACHINES, a term that has been applied generally to the lathe, planer, shaper and all that class of tools used by the machinist to produce the parts of machines that he manufactures. It has also been used to designate presses used for drop-forging, and for shaping metal in the cold, particularly to drawing-presses that receive a sheet of metal, grip it between two surfaces and then subject a part of it to slow pressure until it is drawn out to a cup-shape or the like, if properly done without any wrinkling. A form of rope-twisting machine is also known as a forming machine as well as a machine for forming tin cans. See FORGE; PRESS.

FORMOSA, fôr-mō'sā, called by the Chinese *Taiwan*, an island lying off the coast of the Chinese province of Fû-chien, from which it is separated by a strait from 90 to 220 miles wide. Formosa, which, with a group of about 12 islands called the Pescadors, was ceded by China to Japan in 1895, is crossed by the meridian 121° E. and the tropic of Cancer, and has a maximum length of 235 miles, while its breadth varies from 70 to 90 miles; area, 13,839 square miles. Forming one link in the volcanic chain that extends from the Aleutian Islands southward to New Guinea, it constitutes the eastern escarpment of what was once the great Malayo-Chinese continent, and is connected by a submarine plateau with the Chinese mainland. The back-bone of the island, extending north and south, is formed of a range of densely wooded mountains, called by the Chinese Chu-Shan, which rise to upward of 14,000 feet, the highest known peak, Mount Morrison, being given as 14,362 feet. Eastward of this range lies a narrow strip of mountainous country, presenting to the Pacific a precipitous cliff-wall with in many places a sheer descent of from 3,000 to 7,000 feet, while a very short distance farther east the floor of the ocean sinks to a great depth at an extremely steep gradient. The western side of the range consists of a single broad alluvial plain, stretching from north to south of the island, seamed by innumerable water channels, and terminating at the coast-line in mud flats and sand-banks. Yet on this side of the island the land is rapidly encroaching upon the sea, as the consequence of the gradual elevation of the western seaboard and the deposition in and around the embouchures of the rivers of the large amount of sediment brought down by them from the mountains. This latter process is primarily due to the heavy rainfall of the northern, central and eastern portions of the island, where the rain-clouds of the northeast monsoon, after crossing the warm Kiosiwo or Japanese Gulf Stream, on coming in contact with the mountain barrier of the island become chilled and discharge their contents in rains of excessive violence. Apart from this heavy rainfall, the climate is not exceptional, the insular position ensuring a modification of the heat by sea-breezes. The mean of summer is 80° to 90° F.; of winter, 50° to 60°. Malarial fever is, however, prevalent in the north, and violent typhoons are very common at certain seasons.

The island is famous for the luxuriance of its vegetation; many of the hothouse plants of warm temperature climes grow wild on the mountain slopes and in the valleys, such as orchids, azaleas, lilies, rhododendrons and convolvulus; besides which there is a profusion of ferns, treeferns, camphor- and teak-trees, pines, firs, wild fig-trees, liquidambars, bananas, bamboos, palms, indigo and other dye plants, fibre and paper plants, oil and soap plants, tobacco, coffee and tapioca. «Rice paper» is prepared from the pith of a tree peculiar to Formosa. Of animal life it is noticeable that there are at least 43 species of birds peculiar to the island, that insects are scarce and that noxious wild animals are few; but that fish is plentiful near the coast. The resemblance of the animals found on the island to those on the mainland is one reason for believing there was once a land connection. However there are a number of animals on the island which appear to be of quite a different species from those found in China. This is especially true of some of the birds, mice, squirrels and deer. The chief minerals are coal, of which there is a large supply, gold, salt, petroleum, natural gas and sulphur. Agriculture is an important industry, but the people engaged in mining are becoming more numerous.

Since the treaty of Tien-tsin, in 1858, there have been ports open for foreign commerce; those opened in accordance with the conditions of the treaty are An-ping, Tainan, Takow and Tam-sui. An-ping and Tam-sui have the largest amount of commerce. The principal exports (valued at £1,543,021 in 1915) are camphor, tea, rice, sugar, jute, hemp and dye-woods. The chief imports (valued at £1,277,295 in 1915) are a coarse cloth for clothing, opium, fruits, lumber, metal goods and manufactured tobacco. The most of the trade is with Japan, China and the United States being next in importance. Imports from the United

States were valued at about $1,000,000 in 1912, and exports at about $2,500,000. Formosa controls the camphor markets of the world. The eastern slope of the mountains is covered with the largest camphor forest yet discovered. The value of camphor exported in 1914 was £384,801; and from Formosa alone there is shipped between 6,000,000 and 7,000,000 pounds. Since Formosa was annexed to Japan, the Japanese government has made most successful efforts to preserve the sources of supply of camphor. When the island belonged to China the camphor-trees killed to collect the gum were not replaced and the camphor forests were being destroyed. The Japanese government insists that for every tree destroyed another one must be planted; and it is also establishing camphor plantations, so that in future the Formosa cultivated camphor will be a commodity of commerce. The price of the camphor varies because of the dangers incurred in collecting it. Savage tribes which have never been subdued inhabit the camphor forests, and they never hesitate to attack the camphor gatherers unless the latter are well armed and in bands large enough to protect each other. The Japanese government has now a large armed force of policemen, to protect the camphor gatherers, and the cost of protection is added to the selling price of the gum. The sale of the camphor is a government monopoly; it is not difficult to obtain a permit to gather camphor, but every pound must be sold to the Japanese government, which determines the price. Japan limits the amount to be exported, and will not buy a pound in excess of the limit. The cultivation of the tea fields is receiving attention from Japan, the export of this product being in 1914 valued at £635,874. The chief town is Kainan City (Pop. 53,794). There were 312 miles of railway and 125 miles of light railway in 1914. Shipping entered at Formosan ports in 1913, 438 vessels with a tonnage of 792,724 tons. The currency is Japanese. Formosa was visited by a disastrous earthquake on 17 March 1906, when over 1,200 persons lost their lives.

The inhabitants, numbering 3,612,184 in 1914, consist of Chinese settlers, some Japanese, and the aborigines. A system of colonization from Japan has been adopted by the authorities. Respecting the ethnological origin of these latter there exists some doubt; they seem to consist of several different tribes, mainly of Malayan and Negrito descent. The Chinese distribute them into three classes, Pepohwan, a race of civilized and sinicized agriculturists; Sekhwan, settled tribes who acknowledge Chinese rule; and Chinhwan, the untamed savages of the mountains. The administrative headquarters were formerly at Taiwan, but on the constitution of the island into an independent province of the Chinese Empire in 1887 — it had formerly been incorporated with Fû-chien on the mainland — they were transferred to Tai-per or Bangka. The island was known to the Chinese before the Christian era, but does not seem to have seriously attracted their attention until the year 605 or 606 A.D. In the 14th century they established several colonies in Formosa, which however, were withdrawn in the middle of the 17th century. Although Portuguese and Spanish navigators began to visit the island a century earlier, the first European people to establish themselves on it were the Dutch, who in 1624 built Fort Zealandia, near the modern Taiwan. They were, however, expelled in 1661 by a Chinese adventurer, Koxinga, who retained possession of the island for 22 years. Some years later a regular Chinese colonization of the western half of the island was carried through, the colonists coming principally from Fû-chien and Kwang-tung. Subsequently the island became notorious for the piracy of its inhabitants and the ill-treatment they inflicted upon navigators who chanced to be wrecked on their coasts. Accordingly in 1874 the Japanese invaded Formosa; but on the Chinese undertaking to check the evils complained of they withdrew. Ten years later the French, during their contest with China in Tongking, held for a time the coal districts of Kelung. The occupation by the Japanese troops did not take place without opposition from the natives and Chinese «Black Flags,» but the Japanese were practically in full possession of the island before the end of 1895, and set themselves at once to the work of reorganization. Consult Psalmanazar, 'Description of Formosa' (1705); Cordier, 'Bibliographie des ouvrages relatifs à l'ile Formosa' (1903); Swinhoe, 'Notes (a naturalist's) on Formosa' (1863); Mackay, 'From Far Formosa' (1896); Davidson, 'The Island of Formosa' (1903); Campbell, 'Formosa under the Dutch' (1903); Tekekoshi, 'Japanese Rule in Formosa' (trans. by Braithwaite, 1907); Terry, 'Japanese Empire in Korea and Formosa' (1914).

FORMOSA, South America, a province of Argentina, in the northeastern portion of the republic, lying between the rivers Pilcomayo and Bermejo. It has an area of 41,402 square miles, and population estimated in 1915 of 27,920. Capitol, Formosa on the Paraguay River (pop. about 6,000).

FORMOSAN DEER, a small spotted deer (*Cervus taevanus*), allied to the Japanese sika (q.v.) and a favorite pet among the people of Formosa, who catch the fawns in the mountains.

FORMOSUS, Pope: b. about 816; d. 896. He became cardinal bishop of Porto in 864 and succeeded Pope Stephen VI in 891. He condemned Photius, excommunicated the Emperor Lambert, Duke of Spoleto, and nominated in his place Arnoul, king of Germania. Stephen VII had his body disinterred as that of a usurper, but under John IX, in 898, his pontificate was pronounced valid.

FORMS, or **QUANTICS,** in mathematics, an integral, homogeneous, rational function of two or more variables. According to their dimensions they are named quadric, cubic, quartic, or quintic, etc., denoting forms of the second, third, fourth, fifth degree, etc. Another division, based on their content of variables, is linary, ternary, quaternary, etc. See Functions; Mathematics; Real Variable, Theory of, Functions of the.

FORMS OF ACTION, the classes into which actions are divided in pleading and practice under the common law. See Plea and Pleading.

FORMS OF ADDRESS in the United States are neither so complicated nor so rigidly arranged as in countries where careful gradations of rank and title obtain. Usage, however, sanctions the forms given in the following list:

The President of the United States, governors of States, ambassadors and ministers,—" His Excellency."

The Vice-President of the United States, the heads of the executive departments, justices of supreme and superior courts, lieutenant-governors of States, and mayors,— " The Hon. ——."

Senators and representatives of the United States, or of States,— " The Hon. ——." By courtesy the title is extended to members of State legislatures.

Ex-Presidents, or ex-officials of any of the ranks above cited,— " The Hon. ——."

Archbishops, if cardinals,— " His Eminence the Cardinal Archbishop of ——."

Archbishops, if not cardinals,— " The Most Rev. the Archbishop of ——."

Bishops, in the Roman Catholic and Protestant Episcopal Churches,—" The Right Rev." or " The Right Rev. the Bishop of ——."

Bishops, in the Methodist Episcopal Church, — " The Rev. Bishop."

The designation " Esquire," once chiefly applied to lawyers, is now frequently employed in addressing gentlemen of position.

The forms of address used in foreign countries, particularly those monarchical in government, are arbitrary and elaborate.

FORMULA, Chemical. See CHEMISTRY.

FORMULARY, National, a volume published by a committee of the American Pharmaceutical Association containing prescriptions with directions for making a large number of widely used combinations of drugs. These combinations are the familiar ones that have been used in the treatment of disease for many years.

FORNICATION, illicit carnal intercourse by an unmarried person with one of another sex, whether married or unmarried. It has been the subject of repressive legislation in nearly all countries and in England in 1650 the repeated act of fornication was made a felony without benefit of clergy on a second conviction. In most modern jurisdictions its repression is left to the restraints imposed by public opinion. In some States, fornication is by statute made a misdemeanor, punishable by fine and imprisonment, but in most it is ignored at common law.

FORNIX. See BRAIN.

FORRER, Ludwig, Swiss statesman: b. Islikon 1845. He received his education at the University of Zürich, entered the police department and served some years as attorney of the canton of Zürich. In 1873 he entered on the practice of law in Winterthur, soon after manifested an interest in political life and in 1891 was made president of the Nationalrat. In 1900 he became director of the central office for railways, two years later was elected to the Bundesrat, in which he led the Radical party. He was president of the Swiss Confederation in 1906 and 1912.

FORREST, Edwin, American melodramatic actor: b. Philadelphia, 9 March 1806; d. there, 12 Dec. 1872. In 1820 he made his first appearance in public in the part of Douglas in Home's tragedy of that name, and coming before the New York public in 1826 in the character of Othello, at once gained popularity. In 1836 he crossed the Atlantic and entered on a season at Drury Lane Theatre, London. In the parts of Macbeth, Lear and Othello he achieved distinguished success, and acquired the friendship of Macready, Kemble and others. He again visited England in 1845, and on this occasion quarreled bitterly and causelessly with Macready, whom he accused of trying to damage his reputation from professional jealousy. This quarrel crossed the Atlantic, and when Macready was playing in the Astor Place Theatre, New York, in 1849, the partisans of either actor stirred up a riot that was accompanied by serious loss of life. Between 1853 and 1860 he retired from professional life, but when he returned to the New York stage he filled the rôle of Hamlet with all his former acceptance. His last engagement was in 1871. He was a man of fine presence, well equipped for his profession, naturally frank and engaging. He left a large fortune. Consult Rees, 'The Life of Edwin Forrest' (1874); Alger, 'Life of Edwin Forrest' (1877); Barrett, 'Edwin Forrest' (1882).

FORREST, French, American naval officer: b. Maryland 1796; d. 1866. He served as midshipman in the War of 1812 and won distinction at the battle of Lake Erie. Five years later he was commissioned lieutenant, was made commander in 1837 and captain in 1844. He was adjutant-general during the Mexican War. He threw in his fortunes with the Confederates on the outbreak of the Civil War and was made commandant of the navy yard at Norfolk, later serving as acting Assistant Secretary of the Confederate Navy.

FORREST, SIR George William, British public official and historian: b. Nusseerabad, 8 Jan. 1846. He was educated at Cambridge University, read for the bar in 1870–72 and contributed to the *Saturday Review* and other London journals. He was appointed by the Secretary of State for India to the Bombay Education Department in 1872; acted as Census Commissioner at Bombay in 1882; was employed on special work in connection with Bombay Record. In 1887 he was appointed professor of English history at Elphinstone College and from 1884 to 1888 was director of records at Bombay. He is assistant secretary to the government of India and was knighted in 1913. His publications include 'Selections from the State Papers preserved in the Bombay Secretariat'; 'Selections from the State Papers preserved in the Foreign Office Government of India, relating to Warren Hastings'; 'The Administration of Warren Hastings'; 'Selections from the State Papers preserved in the Military Department of the Government of India, relating to the Mutiny' (2 vols.); 'The Administration of the Marquis of Lansdowne'; 'Sepoy Generals'; 'Cities of India'; 'History of the Indian Mutiny' (3 vols.); 'Life of Sir Nevile Chamberlain' (1909); 'Life of Lord Roberts' (1914).

FORREST, SIR John, Australian explorer and politician: b. Western Australia, 22 Aug. 1847. He entered the survey department of Western Australia in 1865, and in 1874 was at the head of a party which explored the interior from Champion Bay on the west to the overland telegraph line connecting Adelaide on the south with Port Darwin on the north coast. After holding various government posts he was returned unopposed in 1890 to the first Western Australia legislative assembly for Bunbury, and was premier and treasurer 1890–

1901. He was Postmaster-general of Australia 1900–01; Minister of Defense 1901–03; Minister for Home Affairs 1903–04; Treasurer 1905–07, and again in 1909–10, and 1913–14; and since 1901 has represented Swan in Parliament. He was acting Prime Minister of the Commonwealth from March to June 1907. He represented Western Australia at Queen Victoria's two jubilees, 1887 and 1897; and attended as a privy councillor the coronation of King Edward VII 1902, and of King George V in 1911. His publications are 'Explorations in Australia' (1876); and 'Notes on Western Australia' (1884–87).

FORREST, Nathan Bedford, American soldier: b. Bedford County, Tenn., 13 July 1821; d. Memphis, Tenn., 29 Oct. 1877. Moving with his father to Marshall County, Miss., he was in a short while, by the death of his father, left to support his mother and family with a small hill farm. He undertook this work with devotion and energy, and, getting into business in Memphis, became able to purchase a large plantation, and was at the outbreak of the Civil War one of the wealthiest planters in Tennessee. Circumstances had forced him to neglect his own education, though he provided liberally for that of his brothers and sisters. On 14 June 1861 he entered the Confederate service as a private in White's Mounted Rifles, but soon obtained authority to raise a regiment, which he did, purchasing at his own private expense its equipment in Louisville, Ky. These supplies he carried to Memphis, displaying remarkable ingenuity and daring both in eluding the Federal authorities and in defeating a body of their troops with 75 Kentucky Confederates who had come to his assistance. Joining his regiment to the force defending Fort Donelson in February 1862, he was distinguished in the fighting at that point, and, when his superiors had determined upon surrender, led his men through a sheet of icy water past the Federal lines and escaped. Joining Albert Sidney Johnston (q.v.), he was distinguished at Shiloh, where he received a painful wound, which, however, did not long keep him from the field; and by a series of successful movements in Middle Tennessee, then occupied by the Federals, he rapidly rose to great distinction as a cavalry leader, and on 21 July 1862 was promoted brigadier-general. During Bragg's Kentucky campaign he performed great services both on the advance and retreat. Among his most famous exploits in Middle Tennessee was the expedition in which, with less than 1,000 men, he captured McMinnville, and, surprising a garrison of 2,000 Federals at Murfreesboro, captured all the survivors of the fight, including General Crittenden. On 8 May 1863 he captured a raiding force of Federals under General Streight, near Rome, Ga., the Federal force being so much larger than his own that he pressed into service all the citizens in reach in order to form an adequate guard.

After highly distinguished service at the battle of Chickamauga, he was so dissatisfied with the failure to reap the full fruits of that great victory that he tendered his resignation. This was not accepted, but, instead, he was promoted major-general and assigned to the command of all the cavalry in West Tennessee and North Mississippi. Entering West Tennessee with a small force, he was reinforced by several thousand hardy volunteers, who, with his veteran troops, were soon welded into an invincible body known as "Forrest's cavalry." In February 1864 he routed Gen. S. Smith at Okatona, Miss.; then swept northward through Tennessee to the Ohio River, capturing Fort Pillow, Union City and other posts, with their garrisons. In June 1864, with a much smaller force than the enemy, he defeated General Sturgis at Brice's Cross Roads (or Tishamingo Creek), near Guntown, in North Mississippi, capturing all his trains and a third of his men. Gen. A. J. Smith then advanced against him, but after fighting a desperate battle at Harrisburg, near Tupelo, in Mississippi, retreated. Receiving reinforcements from Memphis, Smith advanced again, but Forrest foiled him by making a 60-hour ride to Memphis with half of his force, and by his daring entry into that city compelled Smith's rapid retreat. Then Forrest made havoc with Federal transportation, capturing garrisons and depots in Tennessee, and crowning his exploits by the capture and destruction of $6,000,000 worth of Federal supplies and a gunboat fleet at Johnsonville. Sherman wrote of this as a feat of arms which excited his admiration. Upon Hood's advance into Tennessee, Forrest joined him at Florence and performed important services. As commander of the rear guard of the Confederate army during the retreat from Nashville, his display of heroic qualities and brilliant leadership increased his already great fame. In February 1865 he was promoted lieutenant-general, and to him was assigned the duty of guarding the Confederate frontier from Decatur, Ala., to the Mississippi River. The surrender of the remnant of his command took place on 9 May 1865. During his career he had captured 31,000 prisoners. After the war he returned to civil life.

Joseph T. Derry,
Author of 'The Story of the Confederate States.'

FORREST CITY, Ark., city and county-seat of Saint Francis County, 90 miles northeast of Little Rock, on the Chicago, Rock Island and Pacific and the Saint Louis, Iron Mountain and Southern railroads. It is the seat of Crowley Ridge Institute and has manufactures of cotton, veneers, ice, spokes, lumber, etc. It has a large trade in the agricultural products and live stock of the surrounding district. The city owns the electric plant, waterworks and sewage system. Pop. 2,484.

FORRESTER, Fanny, pen-name of Emily Chubbuck Judson (q.v.).

FORSBERG, Nils, Swedish artist: b. Riseberga, Skåne, 1842. He came of peasant stock and was made a house-painter's apprentice at Göteborg. He executed a statue of Minerva which attracted very favorable notice and secured for him a government pension. He went to Paris in 1867 and there studied painting under Bonnat. He sketched many military scenes of which he was an eyewitness during the siege of Paris. His works include 'An Acrobat Family,' in Göteborg Museum; 'A Hero's Death,' in the Museum of Stockholm. His later work has been chiefly in historical subjects and portraiture. In 1901 he was made chevalier of the Legion of Honor.

FORSKÅL, fôr'skâl, **Peter**, Swedish botanist; b. Helsingfors, 11 Jan. 1736; d. Djerim, Arabia, 11 July 1763. In 1761 he was selected by Frederick V of Denmark to join the scientific expedition to Arabia, to take charge of the department of natural history. He set out on this expedition with Niebuhr, Von Haven and Kramer, and collected plants in the environs of Marseilles, of which he published a 'Flora' at Malta. Neibuhr collected Forskål's papers, accompanied them with remarks, and published them under the titles 'Descriptiones Animalium, Avium, Amphibiorum, Piscium, Inspectorum, quæ in Itinere Orientali observavit P. Forskal' (1775); 'Flora Ægyptiaco, Arabica, etc'.; 'Icones Rerum Naturalium, quas in Itinere Orientali depingi curavit Forskal' (1776).

FORST, Prussia, town on the Neisse, in the province of Brandenburg, 44 miles south of Frankfort-on-Oder. It contains two schools, two hospitals and four churches. Cloth manufacture is the principal industry, but spinning, the making of artificial flowers and dyeing are also important industries. It was founded in the 13th century, became part of electoral Saxony in 1740 and was ceded to Prussia in 1815. Pop. 33,875.

FÖRSTER, fėr'ster, **Heinrich**, German Catholic prelate: b. Grossglogau 1800; d. 1881. He received his education at Breslau, was ordained to the priesthood in 1825 and subsequently became chief preacher at Breslau Cathedral. He was elected bishop of Breslau in 1853, and in the subsequent religious strife in Germany proved himself a staunch advocate of the Roman Catholic Church. At the Vatican Council he opposed the promulgation of papal infallibility, but submitted to the will of the majority. During the Kulturkampf of the seventies he was frequently embroiled with the authorities because of his excommunicating priests who submitted to the May laws. He was deposed by the state in 1875. He published 'Der Ruf der Kirche in die Gegenwart' (4th ed., 1879); 'Die christliche Familie' (6th ed., 1893); 'Kardinal Diepenbrock' (3d ed., 1878); 'Gesammelte Kanzelvorträge' (5th ed., 1879). Consult Franz, A., 'Förster, Fürstbischof von Breslau' (Breslau 1875).

FORSTER, Johann Reinhold, German naturalist: b. Dirschau, Prussia, 22 Oct. 1729; d. Halle, 9 Dec. 1798. In 1753 he became pastor at Nassenhuben, but devoted most of his time to the study of mathematics, natural philosophy, natural history and geography. In 1772 he received the offer of naturalist to Captain Cook's second expedition to the South Seas. In association with his son, he published a work on the botany of the expedition, and 'Observations Made During a Voyage Round the World.' He wrote also 'Introduction to Mineralogy'; 'Flora of South America'; 'Zoology of India,' etc.

FORSTER, John Cooper, British surgeon: b. Lambeth 1823; d. London, 2 March 1886. He entered Guy's Hospital in 1841, was made demonstrator of anatomy in 1850, assistant surgeon in 1855 and surgeon in 1870. In 1844 he became a member of the College of Surgeons, was Fellow in 1849 and president in 1884. He was a prompt and efficient operator and performed practically the first gastrostomy in England. He wrote many papers on acupressure, syphilis, hydrophobia, intestinal obstruction, cancer, etc., and the work 'Surgical Diseases of Children' (1860).

FÖRSTER, Wendelin, German philologist: b. Wildschütz, Bohemia, 1844. He received his education at the University of Vienna, and from 1874 to 1876 he was professor there and at the University of Prague; after 1876 he taught at the University of Bonn. He definitely established the Breton origin of the Arthurian legend. His publications include 'Elie de Saint Gille' (1876–82); 'Li Chevaliers as deus espees' (1877); 'Altfranzösische Bibliothek' (Vols. I–XI, 1879–87); 'Romanische Bibliothek' (Vols. I–XX, 1888–1913); 'Die sammtlichen Werke von Christian von Troyes' (Vols. I–IV, 1884–99); 'Wörterbuch zu Christian von Troyes' (1914).

FORSTER, William Edward, English statesman: b. Bradpole, Dorsetshire, 11 July 1818; d. London, 5 April 1886. He was educated at the Friends' School at Tottenham, and was active in the woolen trade in Bradford. In 1850 he married the eldest daughter of Dr. Arnold of Rugby. In 1865 he became undersecretary for the colonies; in 1868 was appointed vice-president of the council on education and a privy councillor; and in 1870 accepted a seat in Gladstone's Cabinet, and carried through Parliament the Elementary Education Bill (1870) and the Ballot Bill (1872). In 1880 he accepted the post of chief secretary for Ireland at a time when that country was distracted by political and agrarian tumults. To mitigate the severity of the numerous evictions he introduced a Compensation for Disturbance Bill (1880), which was rejected by the House of Lords. The following year he introduced a Land Bill and a Coercion Bill, both of which were passed, and in order to check the growing power of the Land League he declared that organization illegal, and imprisoned Parnell and other members of his party. In April 1882 the government resolved to release the Parnellites and adopt a more conciliatory policy, whereupon he resigned his office. Subsequently he was often found acting in opposition to the government, chiefly in reference to foreign affairs, and he was also opposed to a separate Irish Parliament in Dublin. His opinion on the latter question carried great weight because of his well-known sympathy for Ireland, his abilities as a statesman, his experience in affairs and his unquestioned honesty. Consult Reid, Wemyss, 'Life of Forster' (1888).

FORSYTH, Andrew Russell, English mathematician: b. Glasgow, 18 June 1858. He was educated at Liverpool College and at Trinity College, Cambridge. From 1881 to 1910 he was Fellow of Trinity; from 1884 to 1895 was university lecturer in mathematics, and from 1895 to 1910 was Sadlerian professor of pure mathematics at Cambridge. He is chief professor of mathematics in the Imperial College of Science and Technology, South Kensington, since 1913. He became Fellow of the Royal Society in 1886, was president of the London Mathematical Society in 1904–06, and is member of many scientific bodies of England and the colonies. His publications include 'Treatise on Differential Equations' (1885); 'Treatise on the Theory of Functions' (1893); 'Lectures on Differential Geometry' (1912); 'Lectures on Functions of two or more Complex Variables' (1913). He edited Cayley's 'Collected Mathematical Papers' (1895–98), and has published mathematical papers in various transactions and journals.

FORSYTH, George Alexander, American military officer: b. Muncy, Pa., 7 Nov. 1837; d. Rockport, Mass., 12 Sept. 1915. He served with distinction in the Civil War; was brevetted colonel for gallant services at Five Forks, and brigadier-general in 1868 for his action in an engagement with hostile Indians. He was a member of the board of officers to inspect the armies of Europe and Asia in 1875–76, and on staff and frontier service till 1890, when he was retired on account of disability due to the effect of wounds received during the Civil War and in subsequent Indian campaigns. He has published 'Thrilling Days in Army Life' (1900); 'The Story of the Soldier' (1900).

FORSYTH, James William, American soldier: b. Ohio 1836; d. 1906. In 1856 he was graduated at the United States Military Academy and in the Peninsular and Maryland campaigns of the Civil War was captain on the staff of General McClellan. For bravery at Chickamauga he was brevetted major and in 1864–65 he was chief of staff to General Sheridan. In 1866–67 he was assistant inspector-general of the Gulf Department and from 1869 to 1873 served as aide to Lieutenant-General Sheridan. From 1873 to 1878 he was secretary of the Missouri Division, was made colonel of the 7th Cavalry in 1886, brigadier-general in 1894 and was retired in 1897 with the rank of major-general.. With F. D. Grant he published 'Report of an Expedition up the Yellowstone River' (1875).

FORSYTH, John, American politician: b. Fredericksburg, Va., 1780; d. Washington, 21 Oct. 1841. He was graduated at Princeton College in 1799, and was admitted to the bar in Augusta, Ga., in 1802. He was elected attorney-general of the State in 1808, representative in Congress in 1812 and United States senator in 1818. In 1820 he was sent to Spain as resident minister, where he conducted the negotiations concerning the ratification and execution of the treaty by which Florida was ceded to the United States. In 1823 he was again chosen to the House of Representatives, and was one of the main supporters in Congress of Governor Troup of Georgia in his contest with the national government concerning the removal of the Creek and Cherokee Indians. He became governor of Georgia in 1827, and in 1829 was again returned to the United States Senate. He opposed the South Carolina movement of nullification from its beginning, and voted in favor of Mr. Clay's compromise act of 1833. In the debate in 1834 on the removal of the deposits from the United States Bank, he supported the President, who afterward appointed him Secretary of State, an office which he retained till the retirement of President Van Buren in 1841.

FORSYTH, Peter Taylor, English Non-Conformist divine: b. Aberdeen 1848. He was educated at the Grammar School and University of Aberdeen, and later studied under Ritschl at Göttingen, and at New College, Hampstead. He held ministries at Shipley, Hackney, Manchester, Leicester and Cambridge, and in 1901 was made principal of Hackney Theological College, Hampstead. In 1907 he delivered the Lyman Beecher lectures on preaching at Yale University, published as 'Positive Preaching and Modern Mind.' His other publications include 'Children's Sermons'; 'Religion in Recent Art'; 'The Charter of the Church'; 'The Holy Father and the Living Christ'; 'On Christian Perfection'; 'Rome, Reform, and Reaction'; 'Taste of Death and Life of Grace'; 'Missions in State and Church'; 'The Cruciality of the Cross'; 'The Person and Place of Christ'; 'The Work of Christ' (1911); 'Faith, Freedom, and the Future' (1912); 'The Religion and Ethic of Marriage' (1912); 'The Principle of Authority' (1913); 'Theology in Church and State' (1915); 'The Christian Ethic of War' (1916); 'The Justification of God' (1916); 'The Soul of Prayer' (1916); 'The Church and Sacraments' (1917), and articles in the *Contemporary Review, London Quarterly, Hilbert Journal,* etc.

FORT. A permanently garrisoned post in the United States. For the various individual posts, their location, armament, etc. see MILITARY POSTS.

FORT ADAMS, R. I., United States military post established 1841, at Brenton's Point, R. I., near Newport. There was a garrison here during the Revolution. It is the headquarters of the coast defenses of Narragansett Bay and has a garrison of five companies of coast artillery.

FORT ANCIENT. See MOUND BUILDERS AND MOUNDS.

FORT ANDERSON. See WILMINGTON, CAPTURE OF.

FORT ANN, N. Y., village and former fort in Washington County, on Wood Creek and Champlain Canal, 67 miles north of Troy, on the Delaware and Hudson Railroad. It has manufactories of condensed milk, lumber mills and knitting mills. It is popular as a summer resort. A fortified camp was erected here in 1690 by Fitz-John Winthrop and in 1709 Fort Peter Schuyler was erected. This was rebuilt in 1757 and the name changed to Fort Ann. Nearby engagements were fought during the French and Indian War and the Revolutionary War. The fortifications were partially dismantled by the British in 1777. Pop. 436.

FORT ATKINSON, Wis., city in Jefferson County, 54 miles southwest of Milwaukee, on the Rock River, and on the Chicago and Northwestern Railroad. It has meat-curing establishments, knitting mills, farm implement works, carriage factories and creameries. The government is vested in a mayor, elected for a term of two years, and a council. The waterworks and electric-lighting plant are the property of the municipality. In 1836 a military post was established here by General Atkinson during the Black Hawk War. Pop. 3,877.

FORT BARRANCAS. See NEW ORLEANS, CAMPAIGN AND BATTLE OF.

FORT BLAKELY, Siege and Capture of. Fort Blakely was erected by the Confederates as one of the inland defenses of Mobile, on the east bank of the Apalachee River, and opposite its confluence with the Tensas, about 10 miles northeast of the city. It was on high ground and nearly three miles in extent, with nine well-built redoubts or lunettes armed with about 40 guns. In front was a deep and broad ditch, also an abatis. The garrison consisted of Gen. F. M. Cockrell's division of veteran troops and Thomas' division of Alabama Reserves, in all about 3,500 men, under command of Gen. Saint John Liddell. On 20 March 1865 Gen. F. Steele set out from Pensacola and, by a circuitous march of 100 miles, reached the rear of the fort 1 April and invested it on the 2d with Garrard's division of the 16th corps, Veatch's and Andrews' divisions of the 13th, and Hawkins' division of colored troops, in all 13,000 men. Gradual approaches were made accompanied by heavy and constant skirmishing, and by the 8th Steele had portions of his advanced lines within 450 to 600 yards of the works and 28 guns in position. A general assault was made about 6 P.M. of the 9th; there was a severe struggle in overcoming the obstructions in front of the work; but they were carried and the main works taken by assault, with 3,432 prisoners, 40 guns and 16 battle-flags. The Union loss was 113 killed, 516 wounded. The Confederate loss is not known. The assault on Blakely was the last considerable engagement of the war, and was followed by the fall of Mobile and surrounding forts and by the surrender of the Confederate navy in the harbor. Consult 'Official Records' (Vol. LI); Andrew, 'Siege of Mobile.'

FORT BLISS, Tex., United States military post at El Paso. The size of the garrison depends greatly on whether the border conditions are peaceful or otherwise. In 1915–16 all mobile arms of the service were stationed here, together with a division of the National Guard, mobilized and placed in the Federal service for border patrol duty.

FORT BOWYER, bō'yėr, Ala. (present site of Fort Morgan), a former United States fort at the entrance of Mobile Bay. On 14 Sept. 1814 the garrison of 160 men under General Jackson was unsuccessfully attacked by naval and land forces under Capt. W. H. Percy. On 8 Feb. 1815 the British again made an attack and the fort was surrendered to them on the 11th. (See NEW ORLEANS, CAMPAIGN AND BATTLE OF). Consult Adams, 'History of the United States' (Vol. III, New York 1889–91), and Lossing, 'Pictorial Field Book of the War of 1812' (ib. 1868).

FORT BRAGG, Cal., city in Mendocino County, 125 miles north of San Francisco. It has a public library, lumber mills, canning factories, sash and door factories, bottling works and a creamery. The city owns the waterworks. Pop. 2,408.

FORT CANBY, Wash., United States military post formerly called Fort Cape Disappointment, established on the north shore of the mouth of the Columbia River in 1864. It is a subpost of Fort Stevens, Ore. It was renamed in honor of the distinguished officer, who was killed by the Modoc Indians. Its garrison was temporarily withdrawn in 1905–06 while the post was rebuilding.

FORT CASWELL, N. C., a United States military post, established 1825, on Oak Island, Cape Fear River.

FORT CHIPPEWYAN, or **CHIPEWAYAN,** Canada, a trading station at the western extremity of Lake Athabasca, owned by the Hudson's Bay Company.

FORT CHURCHILL, a trading station situated at the mouth of the Churchill River, on the west shore of Hudson Bay. It belongs to the Hudson's Bay Company.

FORT CLINTON, N. Y., a fort built on the Hudson River, near West Point, in 1777, intended to make the river impassable for the British fleet. It was soon after abandoned.

FORT COLLINS, Colo., city and county-seat of Larimer County, on the Colorado and Southern and the Union Pacific railroads, 74 miles north of Denver. The State Agricultural College is here. A theological seminary (Lutheran) and the headquarters of the Colorado National Forest are also situated here. Other features include a Carnegie library, Federal building, courthouse, hospital and several fine parks. The city is the centre of a fertile region, watered by extensive and efficient systems of irrigation. It has a large beet-sugar factory, alfalfa and flour mills, brick and tile works, and a steel-headgate plant. The United States census of manufactures for 1914 showed within the city limits 34 industrial establishments of factory grade, employing 144 persons, 85 being wage earners receiving annually a total of $27,000 in wages. The capital invested aggregated $392,000 and the year's output was valued at $489,000; of this $189,000 was the value added by manufacture. Fort Collins adopted the commission form of government in 1913. The waterworks are owned by the city. Pop. 11,451.

FORT DARLING (Drewry's Bluff), Attack on, 7 May 1862. President Lincoln, then at Fort Monroe, received a dispatch from General McClellan that his cavalry had made a reconnaissance to Jamestown, on James River, that a Confederate battery at that point had been abandoned, and if it were possible for the *Galena* and other gunboats to move up James River, it would aid him in his movement up the Peninsula on Richmond. The President directed Flag-officer Goldsborough, if he deemed it proper, to send the *Galena* and two gunboats. On the morning of 8 May Capt. John Rodgers, with the *Galena, Aroostook* and *Port Royal,* went up the river and engaged two batteries of 10 guns each, one of which he silenced; the other he passed, two Confederate gunboats retiring up the river as he approached. Rodgers worked his way up the river, meeting with no serious opposition until he arrived at Fort Darling, on Drewry's Bluff, eight miles below Richmond, a strong position on the right bank of the river, about 200 feet above it, and mounting five heavy guns, manned by the crews of the destroyed *Merrimac* and other ships at Norfolk, under command of Captain Farrand, C. S. navy. The guns were mounted in such position as to give a close and plunging fire upon an advancing vessel. At the foot of the bluff the river had been obstructed by piles and sunken vessels secured by chains, and the shore was lined with rifle-pits, sheltering sharpshooters. Rodgers was now joined by the *Monitor* and *Naugatuck*, and on the morning of the 15th ran up and opened fire, the *Galena* leading and anchoring within 600 yards of the fort. The *Monitor* could not bring her guns to bear, and the action was principally confined to the *Galena*, which, after a contest of nearly three and a half hours, withdrew, having been struck 28 times, and losing 24 men killed and wounded. Two of the Confederate guns were dismounted, and Farrand reported a loss of 7 men killed and 8 wounded. Two or three days later, recognizing the fact that the co-operation of the army was needed to carry the position, Goldsborough proposed to McClellan a joint attack, but McClellan preferred waiting until he got his army across the Chickahominy. The Confederates strengthened the position and it remained in their possession until the close of the war, an obstacle to the advance of the gunboats up the James to Richmond, and also to the operation of the army investing Richmond and Petersburg. Consult 'Naval War Records' (Vol. VII); Allan, 'Army of Northern Virginia.'

FORT DEARBORN, a fort built in 1804 by the United States government on the south bank of the Chicago River near its mouth and on the site of the present city of Chicago. At that time the river took a sharp turn to the south just east of the fort and flowed into the lake over a heavy sandbar, which was not capable of being crossed by anything larger than a small boat, and all large vessels bringing supplies to the garrison were compelled to anchor outside and land their passengers and cargoes in small boats. The site of the fort was on a reservation of six square miles which by Wayne's treaty with the Indians, made at Greenville in 1795, had been set aside from the United States. It was named in honor of Gen. Henry Dearborn (q.v.), then Secretary of War.

The fort consisted of a stockade with two block-houses, built in the fashion of all military posts of that period which were situated on the frontier in the vicinity of Indian tribes. The quarters of the garrison were inclosed within the stockade and the first garrison consisted of one company of infantry (of the First regiment).

The growth of the settlement at Fort Dearborn was not rapid until after the War of 1812, owing to the numerous depredations of the Indians upon the white settlers and to the fact that it was so far in the wilderness, being reached from Detroit by a trail through the woods and from Mackinac by lake schooners, generally one in the spring and one in the fall.

Fort Dearborn owes its notoriety, however, to the massacre which occurred near there on 15 Aug. 1812. The second war with Great Britain had broken out and in the beginning in the Northwest all the advantage lay with the British forces and their Indian allies. Mackinac had been captured, thus securing control of the upper lakes to the British, and the American government, apprehensive that a post among the Indians, so far from the frontiers, could not be successfully maintained, thought best to abandon it. Accordingly, Gen. William Hull, in command at Detroit, issued orders to Capt. Nathan Heald, in command of the garrison, to evacuate the fort and that the surplus stores should be divided among the Indians. These orders were executed and on 15 August the garrison and a body of supposedly friendly Miami Indians, escorting a number of women and children, marched out of the fort and set out for Detroit by a road which wound along the lake shore. At a point among the sandhills about two miles from the fort an ambushed band of about 500 Potawatomie Indian savages, in conjunction with the party of Miami who accompanied the troops, attacked the little expedition and the whole body of whites were either captured or killed. Two of the women and 12 children were butchered during the fight, and a number of the wounded men were killed afterward, but some were fortunate enough to be ransomed later. The Indians then sacked the fort and burned it.

In 1816 after peace was concluded the fort was rebuilt under Captain Bradley and its outlines were much extended, under the protection of its larger garrison a small village springing up. In 1823 the fort was again evacuated, but continued to be occupied from 1828 to 1837 when, the Indians having left the country, it was again abandoned, and finally, in 1856, destroyed. Consult Quaife, 'History of Fort Dearborn' (1913).

FORT DE FRANCE, fōr dé frāñs, or **FORT ROYAL**, fōr-rwä-yal, Martinique, French West Indies, a town, seaport and capital of this island of the Lesser Antilles, which, except Guadeloupe, is the largest in the Caribbean chain. It is situated in the southwestern part of the island and on the north side of a deep and well-sheltered bay protected by a fort. The city is important as it is the military and naval headquarters and rendezvous of the French Antilles, and the terminus of the French transatlantic steamers, and of the West Indies cable system. The principal buildings are the parish church, government offices, the barracks, arsenal and hospital. Fort Royal is the residence of the French governor. There is a law school in the city. In the public gardens is a statue of the French empress, Josephine, who was born in Martinique. In 1839 Fort de France was partially destroyed by an earthquake, and in 1890 fire nearly consumed the entire city. The eruption of Mont Pelée (q.v.), in May 1902, did no material damage to the city and it became the distributing centre for the supplies sent to the island from outside sources. Pop. 27,069.

FORT DE L'ÉCLUSE, fôr de lā'klüz', a fortress in the department of Ain, France, on the Rhone River, 14 miles south of Geneva, standing upon a crag 1,385 feet high at the foot of Mont Credo, which commands the passage of the Rhone River from Switzerland through the defile of the Écluse. It was erected by the duke of Savoy, and during the 16th century was repeatedly the object of attacks by the Swiss armies, and was several times destroyed. During the reign of Louis XIV it was rebuilt by Vauban at the king's command, but in 1815 was captured and demolished by the Austrians. Again coming into French possession it was completely restored, and since then the fortifications have been remodelled and strengthened.

FORT DODGE, Iowa, city and county-seat of Webster County, on the Des Moines River, and on the Illinois Central, the Chicago Great Western and the Minneapolis and Saint Louis railroads, 135 miles east of Sioux City, 200 miles west of Dubuque, 85 miles north of Des Moines and 200 miles south of Minneapolis. The city has many natural advantages, being an important railroad centre (the railroad shops employing, on an average, 1,200 men); in the vicinity are large deposits of coal, gypsum and potter's and brick clay; and it is a jobbing centre for the surrounding territory. Among the industries are a shoe factory, oatmeal mill, several plaster mills, gypsum and clay products works, brick plants, pottery works, boiler works and foundries. The educational facilities comprise high and public schools, parochial schools, Tobin College and Elmwood School. Nearly all religious denominations are represented in the city. Among the notable public buildings are the county courthouse, government building and public library. There are five banks in the city with a combined captalization of $475,000. Fort Dodge was first settled in 1854 by Maj. William Williams, became a borough in March 1854 and was incorporated as a city in 1869. The affairs of the city are administered under the commission form of government, it being one of the first cities in the State to adopt the new method. The city owns and operates the waterworks. The predominating foreign nationalities represented in the population are Scandinavians, Germans and Irish-Americans. Pop. 20,648.

FORT DONELSON, a fort erected in 1861 by the Confederates in Stewart County, northwestern Tennessee, just south of the boundary line between Kentucky and Tennessee, on the left bank of the Cumberland River, and about 63 miles northwest of Nashville and 12 miles from Fort Henry. It was on a hill 120 feet above the level of the river and, having a line of rifle pits two and a half miles in extent to defend the land approach, and three heavy batteries commanding the river, was considered one of the best fortified posts along the Confederate line of defense in the Mississippi Valley. Here, on 13–16 Feb. 1862, an important battle was fought between General Grant in command of the Union forces, and General Buckner in command of the Confederates, resulting in the surrender of the fort by Buckner, together with 57 guns, 14,500 men and immense quantities of provisions and munitions of war. See FORT HENRY AND FORT DONELSON.

FORT DOUGLAS, Utah, United States military post on the Union Pacific Railroad, three miles east of Salt Lake City and 37 miles from Ogden. It was established in 1862, occupies a reservation of over 9,000 acres at the base of the Wahsatch Mountains and has quarters for about 500 soldiers. It was established to prevent depredations by Indians along the line of the overland mail route.

FORT DUPONT, Del., United States military post in New Castle County, opposite Pea Patch Island. It occupies a reservation of about 175 acres and has quarters for two companies of infantry. The nearest post office and telegraph station are at Delaware City, Del.

FORT DU QUESNE, kān, colonial fort in Pennsylvania erected at the confluence of the Allegheny and Monongahela rivers and upon the site of the present city of Pittsburgh (q.v.). It was begun in February 1754 by a force of Virginians under Capt. William Trent, and Ensign Ward, who had been sent forward by Governor Dinwiddie, of Virginia, to erect a fortification of sufficient size to be a warning to the French against further intrusion on English territory. On 17 April, before the work had been completed, the Virginians were attacked by a force of 700 French and Indians and were compelled to leave the fort, which was then enlarged and completed by the French, who named it Du Quesne. Near the fort, on 9 July 1755, took place the terrible defeat of the British General Braddock (q.v.), who was ambushed there by a detachment of French and Indians while on his way to retake the fort from the French. The fort and surrounding territory remained in the possession of the French until 25 Nov. 1758, when General Forbes, leaving Philadelphia early in July in command of an army of 10,000 British and Colonial troops, with a few Indian allies, met Col. George Washington (q.v.), and together captured it, not, however, till the French had fired it and fled. It was then, at Washington's suggestion, renamed "Pittsburgh," in honor of the British Prime Minister, William Pitt.

The fort was occupied for the winter by a small garrison and in 1759 General Stanwix built Fort Pitt, which was the scene of many engagements during the Indian wars and the French and Indian War. During the period of Pontiac's Conspiracy in 1763 the Indians besieged the fort, then under command of Captain Ecuyer, from 22 June to 6 August, but were twice defeated by troops from the fort and were finally driven off by a force of 500 British regulars under Col. Henry Bouquet, who had been sent by General Amherst. Bouquet, a short time afterward, built a brick blockhouse not far from the fort and this "Old Blockhouse," which is still standing, is the only remnant of the extensive fortifications erected by the British during their occupancy of the vicinity till the outbreak of the American Revolution. This remnant is now owned and is being preserved by the Daughters of the American Revolution. See COLONIAL WARS IN AMERICA, 1755–63—*Seven Years' War; 1758, Louisburg . . . Du Quesne; 1763–64, Pontiac's War.*

FORT EDWARD, N. Y., colonial, on the upper Hudson at its great bend, where stands the present village of Fort Edward; known as the Great Carrying Place during the 17th and 18th centuries (that is, to Lake George and Lake Champlain), and an obvious advanced post for Canadian wars. Francis Nicholson built a stockade there for that purpose in 1709; it rotted away in disuse, but in 1755, at the opening of the French and Indian War, Phineas Lyman began another called by his name. It was completed by Colonel Eyre under Sir William Johnson, who after the battle of Lake George (q.v.) renamed it Fort Edward, after the Duke of York, grandson of George II. In 1757 it was raided from Canada and 11 soldiers killed. Later the survivors of the massacre of Fort William Henry (q.v.) were sent here by Montcalm, and shortly afterward several thousand militia flocked thither to the rescue, but had to be sent home on arriving too late. In March 1758 an expedition from there under Maj. Robert Rogers was nearly destroyed by the Indians. During this period Fort Edward was known to the French as «Fort Lidius» or «Lydius.» Jane McCrea (q.v.) was living in a little settlement near the fort, when she started on her ill-fated journey 27 July 1777 to meet her lover in Burgoyne's camp. After her death she was buried near the «black house» at Fort Edward Centre. Her remains were removed in 1823 or '24 to the old Fort Edward Cemetery; in 1852 her remains were again exhumed and buried in the Union Cemetery between Fort Edward and Sandy Hill. The Jane McCrea Chapter, D. A. R., has erected a marker at Fort Edward near the spot where she was killed. In the Revolution the old fort was successively the headquarters of Schuyler, Burgoyne, and Stark. Consult Parkman, 'Montcalm and Wolfe' (1884), 'Fort Edward in 1779–80,' 'Historical Magazine,' 2d series, Vol. II (1867). Fort Edward village is located on the Delaware and Hudson Railroad, Champlain Canal and Hudson Valley Railway. Here through a system of locks the Glens Falls Feeder empties into the Champlain Canal. The manufacture of pulp and paper constitutes the principal industry of the village, and here are large mills of the International Paper Company Trust. It is noted as the home of the Fort Edward Collegiate Institute, has a good union school system, a flourishing national bank, five churches and brewing, shirt-making and pottery industries. Fort Edward possesses many points of interest to the antiquarian and historian on account of its intimate connection with the events of the French and Indian and the Revolutionary Wars. Pop. 3,762.

FORT ERIE, Canada, a post village in Welland County, Ontario, on Lake Erie, at the head of the Niagara River, opposite Buffalo, N. Y., with which it is connected by a railroad bridge. Three railways enter the town, which is a port of entry and has an American consulate. Pop. about 1146. The present town stands upon the site of old Fort Erie, which was the scene of considerable fighting during the War of 1812. On 28 May 1813 the British forces abandoned the fort and partially demolished it, and during the next few months, with the varying fortunes of war, it was held alternately by the American and British forces. Early in July Maj.-Gen. Jacob Brown (q.v.) with 5,000 troops, backed by 4,000 New York militia, which had been ordered out and authorized for the war, invaded Upper Canada from Buffalo, and one of his first objects of attack was Fort Erie, which surrendered to him on 3 July. Two days later at Chippewa he successfully attacked General Riall, who lost 511 men killed and wounded. After the bloody battle of Lundy's Lane (q.v.) on 25 July, fought between the American generals Brown and Winfield Scott and the Canadian general Sir Gordon Drummond (q.v.), the American forces, numbering about 2,000 men, under command of General Ripley (both Brown and Scott having been wounded), were forced to return to the fort, having suffered a loss of 743 men as against a British loss of 878. The American forces were shortly afterward (7–14 August) unsuccessfully attacked by Drummond, who, after an almost constant bombardment during the seven days, retired with a loss of 500 men. Brown was, however, blockaded within the walls of the fort until September. The fort remained in possession of the Americans till 5 November, when, upon retiring from Canada, they blew up the fortifications. These were never again rebuilt. See UNITED STATES — THE WAR OF 1812.

FORT ETHAN ALLEN, Vt., United States military post located near Essex Junction, about five miles east of Burlington, occupying a reservation of 761 acres. It was established in March 1893, has accommodations for about 800 troops, and was designed to form a link in the chain of military posts along the northern frontier of the United States.

FORT FAIRFIELD, Me., town in Aroostook County, 140 miles north of Bangor, on the Aroostook River, and on the Canadian Pacific and other railroads. It has a Carnegie library, is situated in a thriving agricultural region, noted for its production of potatoes. Pop. 4,381.

FORT FISHER, in North Carolina, erected by the Confederates on the peninsula between Cape Fear River and the Atlantic to defend the entrance to the port of Wilmington, was one of the most formidable earthworks on the Atlantic coast and was built to withstand the heaviest artillery fire. Its parapets were 25 feet thick, with an average height of 20 feet, and mounted 44 heavy guns. At the close of 1864, when it was determined by the United States forces to reduce it and close the port of Wilmington to blockade-runners, it had a garrison of 1,400 men, under command of Col. William Lamb. The combined naval and army expedition sent against it was under command of Adm. D. D. Porter and Gen. B. F. Butler. Porter's fleet of about 150 vessels, the largest that had ever sailed under the Union flag, left Hampton Roads 13 Dec. 1864 and arrived in sight of the fort on the 20th. As a preliminary to the attack the old steamer *Louisiana* was loaded with 215 tons of powder which was to be exploded under the walls of the fort, with the expectation that the explosion would dismount the guns, level the works and demoralize the garrison, thus allowing the troops to land and easily take the works. At 1.40 A.M. of the 24th, without notifying Butler of the fact, when the *Louisiana* was within 300 yards of the beach and 400 yards of the fort, the powder was exploded, but did no damage, scarcely disturbing the slumbers of the garrison. At daylight the fleet ran in, and at 11 o'clock opened a furious fire, which was continued several hours, doing no material damage, and was responded to with spirit and effect. On the 25th the bombardment was renewed and under cover of it Butler landed 3,000 men two miles above the fort, and was assured by Porter that the navy had so completely silenced the work that all he had to do was to march his troops into it. But Butler and Weitzel, who was in immediate command of the troops, after a careful reconnaissance found the fort uninjured, deemed it unadvisable to attack it, re-embarked the men and returned to James River to assist in the siege of Petersburg. Porter's fleet lost 83 men killed and wounded. The Confederates had 58 killed and wounded. The failure to take the fort produced great disappointment; it is now generally conceded that Butler and Weitzel acted wisely in not making the attempt. A second expedition against the fort sailed 12 Jan. 1865, and on the 13th 8,000 men were landed under Gen. A. H. Terry, who had been designated to command the land forces, which, as before, were under the immediate command of General Weitzel. At 3.30 P.M. the fleet stood in and began a furious bombardment, which was continued next day, causing a loss to the garrison of 200 men, and silencing many of the guns. A combined naval and land attack was planned for the 15th, and 1,600 sailors and 400 marines were landed to co-operate with the army. The fleet opened fire at 9 A.M. and continued it until 3 P.M., when 50 steam-whistles from the fleet gave the signal for the land assault. The naval column, armed with cutlasses and pistols, charged the right flank or sea-face of the work, reached its foot, and those in advance began to climb the parapet, but the Confederates mounted on it repulsed them, and the entire body retreated in disorder with a loss of 82 killed and 269 wounded. The army was more successful; advancing on the left flank or land-face of the work, it forced a lodgment, and after a hard struggle, which was continued far into the night, carried the entire work, capturing, as reported by General Terry, about 2,000 men, with a loss of over 900. The Confederate defense of the fort was one of the most gallant of the war, and cost them about 500 killed and wounded. The Union loss, army and navy, was 266 killed, 1,018 wounded and 57 missing. The fall of Fort Fisher closed the port of Wilmington, and was soon followed by the fall of that city. Consult 'Official Records' (Vol. XLII); 'Naval War Records' (Vol. XI); Ammen, 'The Atlantic Coast'; Maclay, 'History of the Navy' (Vol. II); The Century Company's 'Battles and Leaders of the Civil War' (Vol. IV).

FORT GAINES, Ga., city and county-seat of Clay County, 140 miles southwest of Macon, on the Central of Georgia Railroad, and on the Chattahoochee River. Cotton and fruit are the principal crops of the region. The city has brick works, fertilizer works and cottonseed oil mills. It owns the electric-lighting plant and the water-supply system. Pop. 1,320.

FORT GAINES and FORT MORGAN. Fort Gaines was a walled work on Dauphine Island, at the western entrance of Mobile Bay, and with Fort Morgan, a much larger work, on Mobile Point, nearly four miles distant, at the eastern entrance, was seized by the governor of Alabama 5 Jan. 1861. Both forts remained in Confederate possession until August 1864, at which time Fort Gaines had 30 guns. Fort Morgan was armed with over 40 guns, and had a mortar battery in front of seven heavy guns. Admiral Farragut attacked and passed both works when he ran into Mobile Bay, 5 Aug. 1864, and virtually destroyed the Confederate squadron. Gen. Gordon Granger landed troops on Dauphine Island on the 4th and began to invest Fort Gaines; on the 6th Farragut shelled it, and on the 7th the fort and its garrison of 818 officers and men surrendered. Fort Morgan held on longer, but Granger transferred his troops from Dauphine Island to the rear of the fort, invested it, got 34 guns in position to bear on it, and on the morning of the 22d, in co-operation with Farragut's fleet, opened his guns upon it, and kept up a continuous fire until the morning of the 23d, when the fort surrendered to Farragut.

FORT GARRY, Canada. See WINNIPEG.

FORT GEORGE, Canada, a former fort on the Canadian side of the Niagara River. On 27 May 1813 it was captured by the American forces under Col. Winfield Scott. On 10 Dec. 1813 the fort was evacuated by General McClure. See FORT GEORGE, BATTLE OF.

FORT GEORGE, Battle of, 27 May 1813, in the War of 1812. The fort was near the mouth of the Niagara River, on the Canada side, nearly opposite Fort Niagara, and was garrisoned by about 1,000 British regulars and several hundred militia under General Vincent. The American force of some 4,000 undertook to take it in the rear and capture the garrison; the nominal commander was Morgan Lewis, the real one Winfield Scott. The forces were landed from the fleet under nominal commander Chauncey, the real one being Oliver Hazard Perry, and a joint attack was made. The fleet enfiladed the beach; Scott advanced along the shore, and made a flanking movement. Vincent evacuated the fort, spiked the guns and slowly retreated, parallel to the river, beyond Queenston Mount, losing 51 killed and 305 wounded and missing, from his regulars, while most of the militia were captured. American loss, 40 killed, 120 wounded. The other forts on the river were soon abandoned by the British.

FORT GRANT, Ariz., a former United States military post and reservation at the foot of Mount Graham, established in 1863 by the California volunteers as a protection against the Apaches to the southern line of travel to California. It occupies a reservation of 42,341 acres, originally called "Camp Grant," 26 miles from Wilcox, Ariz. In 1911 it was relinquished by the War Department and turned over to the Interior Department.

FORT GRISWOLD, Conn. See FORT GRISWOLD, MASSACRE OF.

FORT GRISWOLD, Massacre of, 6 Sept. 1781. Hearing of Washington's southern march, Sir Henry Clinton, as the only available diversion, sent an expedition against New London, Conn., where a quantity of stores was collected, with slight defense from Fort Trumbull on the New London side and Fort Griswold on the Groton side of the Thames, and which was a nest of privateers that had greatly annoyed the British. Benedict Arnold was selected to head it, as a Connecticut man; an ugly method of sealing his new allegiance. On taking possession of Fort Trumbull, it became evident that the American shipping would escape unless Fort Griswold were captured also; it was reported unfinished and occupied only by 20 or 30 men, and Arnold ordered an attack on it. Shortly seeing that it was stronger than he supposed, and garrisoned by those who had escaped from Fort Trumbull, and that the ships were escaping up the river, he countermanded the order, but too late. The British detachment of 600 regulars had assailed the fort, where 157 militia had gathered; and after 40 minutes' assault, with the loss of 192 men, the British carried it, and despite appeals for quarter, massacred nearly the whole garrison. Colonel Ledyard, the commander, and 70 others were killed, 60 wounded, 35 mortally, and only 26 escaped unhurt. The British officers, however, did their best to stop the slaughter, and the atrocious story formerly told of the murder of the colonel is fiction. The massacre of garrison *in terrorem,* to teach them not to defend untenable places, was justified by the European rules of war at the time, but had not been practised in America. Even American officers, however, spoke of it at the time as a regrettable but almost inevitable incident of war. Consult 'The Massacre of Fort Griswold' (in 'Magazine of American History,' Vol. VII, 1880).

FORT HAMILTON, N. Y., United States military post at the Narrows, on the southwest shore of Long Island, New York Bay, established in 1831. It is one of the principal defenses of New York city. During the American Revolution the British landed here prior to the battle of Long Island, 1776.

FORT HANCOCK, a Federal military station established at Sandy Hook, N. J., in 1892, as one of the outer fortifications of New York Harbor. It is the headquarters of the coast defenses of southern New York. A proving ground of the Ordnance Department is located here. The fort was named in memory of Winfield Scott Hancock, U. S. A.

FORT HARRISON, Battle of (including Chaffin's Farm, Fort Gilmer and New Market Heights). In the latter part of September 1864 General Grant ordered a movement against the Confederate troops north of James River, defending Richmond. Grant hoped to make General Lee so weaken the garrison at Petersburg that the Union forces might carry it. The great object, however, was to prevent Lee sending reinforcements to Early in the Shenandoah Valley. September 28, during the night, General Ord crossed from the south to the north bank of the James, and on the 29th, with 4,000 men, driving before him the Confederate outposts, appeared before Fort Harrison, on Chaffin's Farm, the strongest work on the Confederate line. Birney, with 10,000 men, moved by roads farther to the right. Stannard's division, which led the advance of Ord's column, moved to the assault of Fort Harrison, under a very severe fire of artillery and musketry, and after a sharp encounter carried it with its 16 guns and nearly 300 prisoners, at a loss of over 500.

Ord being severely wounded, the command of his corps fell to General Heckman, whose division, following Stannard's, passed to the right of Fort Harrison, attacked Fort Gilmer and was repulsed with heavy losses. Meanwhile General Birney had advanced on the New Market road, captured some of the advanced rifle-pits, running northeast from Fort Harrison, and established connection with Heckman. General Grant now appeared and ordered an advance on the right At 3 P.M. Birney made another assault upon Fort Gilmer, but was badly repulsed. Grant ordered the troops to entrench. General Lee transferred seven brigades from his lines at Petersburg to the north side of the river, and massed 10 brigades at and near Fort Gilmer to assault and retake Fort Harrison. The assault was made 2 P.M. of the 30th by Gen. R. H. Anderson, commanding Longstreet's corps, with five brigades, and was repulsed. Twice the Confederates reformed, and renewed the assault, but were repulsed, leaving a large number of killed and wounded and seven battle-flags on the ground, and the effort to dislodge the Union troops was abandoned. The Union loss on the 29th and 30th was 383 killed, 2,299 wounded and 645 missing, an aggregate of 3,327. The loss of the Confederates is not definitely known, but it was near 2,000 in killed, wounded and missing. Consult 'Official Records' (Vol. XLII); Humphreys, 'The Virginia Campaign of 1864-65.'

FORT HENRY AND FORT DONELSON. These forts were constructed by the Confederates just south of the boundary line between Kentucky and Tennessee, the former on the right bank of the Tennessee River, the latter on the left bank of the Cumberland, the distance between the two being 12 miles. On 28 Jan. 1862 Commodore Foote and General Grant asked General Halleck's permission to take Fort Henry. Halleck assented, and on the morning of 2 February Foote's flotilla of ironclads and gunboats, followed by a fleet of transports, carrying Grant's troops left Cairo, anchoring six miles below Fort Henry on the morning of the 4th. The fort was defended by 17 heavy guns, and its land approach was covered by rifle-pits held by 3,000 men. Gen. Lloyd Tilghman was in command. About 11.20 A.M. of the 6th Foote steamed up toward the fort and attacked it with four ironclads, Tilghman, with about 90 men to work 11 guns bearing on the river, returning the fire. After a contest of an hour and a quarter Tilghman hauled down his flag and surrendered with 78 men, having lost 16 killed and wounded. The 3,000 men in the rifle-pits retreated to Fort Donelson. The fleet had 29 killed and wounded. Grant, who had landed his troops six miles below the fort, arrived too late to take part in the action.

Grant reported to Halleck that on the 8th he would take and destroy Fort Donelson. Foote, however, was compelled to return to Cairo for repairs to his fleet, and the movement was deferred until the morning of the 12th, when Grant marched across the country, with about 16,000 men, arriving before Fort Donelson in the evening. The fort was on a commanding hill, 120 feet above the level of the Cumberland, with three heavy batteries commanding the river, and a line of rifle-pits to defend the land approach. On the morning of the 13th the fort and works were held by 18,000 men, under command of General Floyd. The rifle-pits, two and a half miles in extent, were held by General Buckner on the right and General Pillow on the left.

Grant formed his line of investment with General McClernand on the right and General Smith on the left, and at dawn of the 13th opened a furious cannonade and sharp skirmishing. In the evening Foote's flotilla and reinforcements for Grant arrived— Crufts' brigade and several regiments from Fort Henry and Cairo. These were formed into a division of 10,000 men, under Gen. Lew Wallace, and put in the line between McClernand and Smith, raising Grant's force to 26,000 men. At 2 P.M. of the 14th Foote attacked the fort, and at the end of an hour and a half was compelled to withdraw, two of his ironclads being entirely disabled and the other two partially so. He had 54 men killed and wounded. It was then concluded that Foote should return to Cairo and repair damages, while Grant should perfect his investment, fortify his lines and await the arrival of reinforcements and the return of Foote.

The Confederates shaped the course of events otherwise. They decided to break the right of Grant's investing line and escape by roads leading to Nashville. In pursuance to the plan adopted, Pillow, on the Confederate left, supported by a part of Buckner's command, advanced at daybreak of the 15th, with 10,000 men, and after a hard fight gained the right of McClernand's line and forced it back. McClernand called for assistance and, in the absence of Grant, who had gone to confer with Foote, Lew Wallace sent Crufts' brigade to his support, but the Confederates continued to gain the advantage, pushing back McClernand's two right brigades and their supports. Buckner made an attack upon McClernand's left and was repulsed; but rallying his men, he renewed the attack, and the whole right wing of Grant's army was forced back, the Confederates still following up their advantage, when Wallace threw Thayer's brigade to the right and across their line of advance and after a sharp fight, checked them, driving some back to their entrenchments. It was 2 P.M. when Grant came on the field to find nearly half his army driven from position and the way open for Confederate escape. He ordered a counter-attack. Smith, commanding on the left, formed a brigade in column, led it under severe fire, and seized the Confederate works in his front and on the high ground surrounding the fort. Wallace and part of McClernand's forces, advancing on the right, gained the greater part of the ground lost early in the day, and by night the line of investment was re-established. Grant made preparations to renew the attack early next morning, but during the night the Confederate commanders came to the conclusion that escape was impossible, that Grant was too strong to be beaten and that nothing remained but a surrender. Floyd, senior in rank, announced personal reasons against a surrender and passed the command to Pillow, who in turn passed it to Buckner. Floyd and Pillow, with the aid of two small steamboats, succeeded in getting away with about 1,200 officers and men, principally of Floyd's old brigade, and Colonel Forrest, with some 500 cavalry and other small detachments, escaped in the night by the river road.

At an early hour of the 16th, as Grant was about to renew the attack Buckner sent him a note proposing «the appointment of commissioners to agree upon the terms of capitulation,» and suggesting an armistice until 12 o'clock. Grant replied: «No terms except unconditional and immediate surrender can be accepted. I propose to move immediately upon your works.» Buckner surrendered 14,500 men, 57 guns and a large amount of ammunition and stores. The Union loss, army and navy, was 510 killed, 2,152 wounded and 224 missing. The Confederate loss, killed and wounded, was about 2,000. The capture of Forts Henry and Donelson broke the first line of Confederate defense in the Mississippi Valley, and caused the abandonment of Columbus, Bowling Green and Nashville. Consult 'Official Records' (Vol. VII); Force, 'From Fort Henry to Corinth'; Swinton, 'Decisive Battles of the War'; The Century Company's 'Battles and Leaders of the Civil War' (Vol. I); Grant, 'Personal Memoirs' (Vol. I).

FORT HINDMAN, or **ARKANSAS POST, Battle of.** After General Sherman's failure at Chickasaw Bayou (26–31 Dec. 1862), his army and Admiral Porter's fleet returned to Milliken's Bend, where, 4 Jan. 1863, Gen. J. A. McClernand superseded Sherman in command and moved against Fort Hindman, situated on the north bank of the Arkansas River, 50 miles from its mouth, commanding the approach to Little Rock and protecting the valley of the Arkansas. The fleet, three ironclads and six gunboats, entered White River, and from it passed through a cut-off to the Arkansas, 9 January. The army of 29,000 men landed about four miles below the fort, a large square-bastioned work, on high ground, at the end of a horseshoe bend in the river, mounting 18 guns, and garrisoned by about 5,000 men, under command of Gen. T. J. Churchill. A line of rifle-pits surrounded it. The ironclads began the attack on the 10th, and the entire fleet, gradually moving up, shelled the Confederates out of the rifle-pits and back into the fort. On the 11th the navy opened a furious fire upon the fort, McClernand's artillery joining in the fire from the land side. Churchill's guns were silenced, and McClernand ordered a general assault. After a severe contest the fort was carried with a loss to the Union army of 134 killed, 898 wounded and 29 missing. The naval loss was 6 killed and 25 wounded. The Confederate loss was 60 killed, about 80 wounded and 4,791 captured. On the 12th McClernand received peremptory orders from General Grant to return to Milliken's Bend with his entire command. The prisoners were sent to Saint Louis, the fort was dismantled and blown up and the fleet and troops went down the Arkansas to Napoleon, on the Mississippi. Consult 'Official Records' (Vol. XXII); Greene, 'The Mississippi'; Mahan, 'The Gulf and Inland Waters'; Maclay, 'History of the Navy' (Vol. II); The Century Company's 'Battles and Leaders of the Civil War' (Vol. III).

FORT HOLMES, Mich. See MACKINAC ISLAND.

FORT JACKSON and **FORT SAINT PHILIP.** Fort Jackson was built between 1824 and 1832 on the right bank of the Mississippi, about 80 miles below New Orleans. Together with Fort Saint Philip on the opposite bank, half a mile above, it defended the city from water attack. Both forts were seized by Louisiana State troops 11 Jan. 1861, were strengthened and garrisoned, and remained in Confederate possession until taken by Admiral Farragut in April 1862, at which time they were garrisoned by about 700 men each. Fort Jackson was armed with 74 guns, Fort Saint Philip with 52. In March 1862 Farragut assembled a powerful fleet at Ship Island and at Southwest Pass, at the mouth of the Mississippi, for the capture of New Orleans, and 18 April Commodore Porter, in command of a strong flotilla, opened fire upon Fort Jackson and Saint Philip. During six days he threw 16,000 shells, but was unable to reduce the forts.

It was found necessary to run past the forts and destroy the Confederate navy above before

New Orleans could be taken. On the 24th Farragut, with 17 vessels, in a single line, carrying 192 guns, steamed up the river, engaging both forts with heavy broadsides of shot, shell, and canister, receiving heavy fire in return. Passing the forts and obstructions, he engaged and destroyed the Confederate fleet, in one of the most spectacular naval battles of the war. Within an hour and a half after leaving its anchorage Farragut's fleet had passed the forts and destroyed 11 Confederate vessels. With 13 of his own vessels Farragut proceeded up the river, and at noon of the 25th anchored before New Orleans, which was abandoned by the Confederate troops holding it, and surrendered by the civil authorities. Porter, who had remained below, continued his bombardment of the forts, which were surrendered on the 28th. The Union loss was 37 killed and 147 wounded. The loss in the forts was 14 killed and 39 wounded; that in the Confederate navy is not known. Consult The Century Company's 'Battles and Leaders of the Civil War,' (Vol. II); Mahan, 'The Gulf and Inland Waters'; Maclay, 'History of the Navy' (Vol. II).

FORT KENT, Me., village in Aroostook County, 200 miles north of Bangor, on the Fish River, and the Bangor and Aroostook Railroad. It is the seat of the Madawaska Training School and the Convent of Saint Louis. Lumbering is the principal industry. In the village are preserved relics of the Aroostook War. Pop. 3,710.

FORT LEAVENWORTH, Kan., United States military post and reservation, three miles from Leavenworth. The post was established in 1827 by Colonel Leavenworth as a protection to the old Santa Fé trail against the depredations of the Indians. The station includes a military prison, army service schools, a post-office and telegraph office, and a garrison made up of all divisions of the service. The reservation is located to the west of the Missouri, 500 miles above its junction with the Mississippi. It is situated on the lines of the Missouri Pacific and the Kansas City, Wyandotte and Northwestern railroads.

FORT LEE, N. J., borough in Bergen County, 15 miles north of Jersey City, across the Hudson River from New York. It has a picturesque situation on the Palisades and is a favorite residential suburb of the metropolis. The Institute of the Holy Angels is located here. Its industrial establishments are few, but the motion picture industry is important, and there are also piano actions made here. On 20 Nov. 1776 General Greene and the American forces evacuated Fort Lee, and narrowly escaped capture by 5,000 British under Cornwallis. Pop. 5,288.

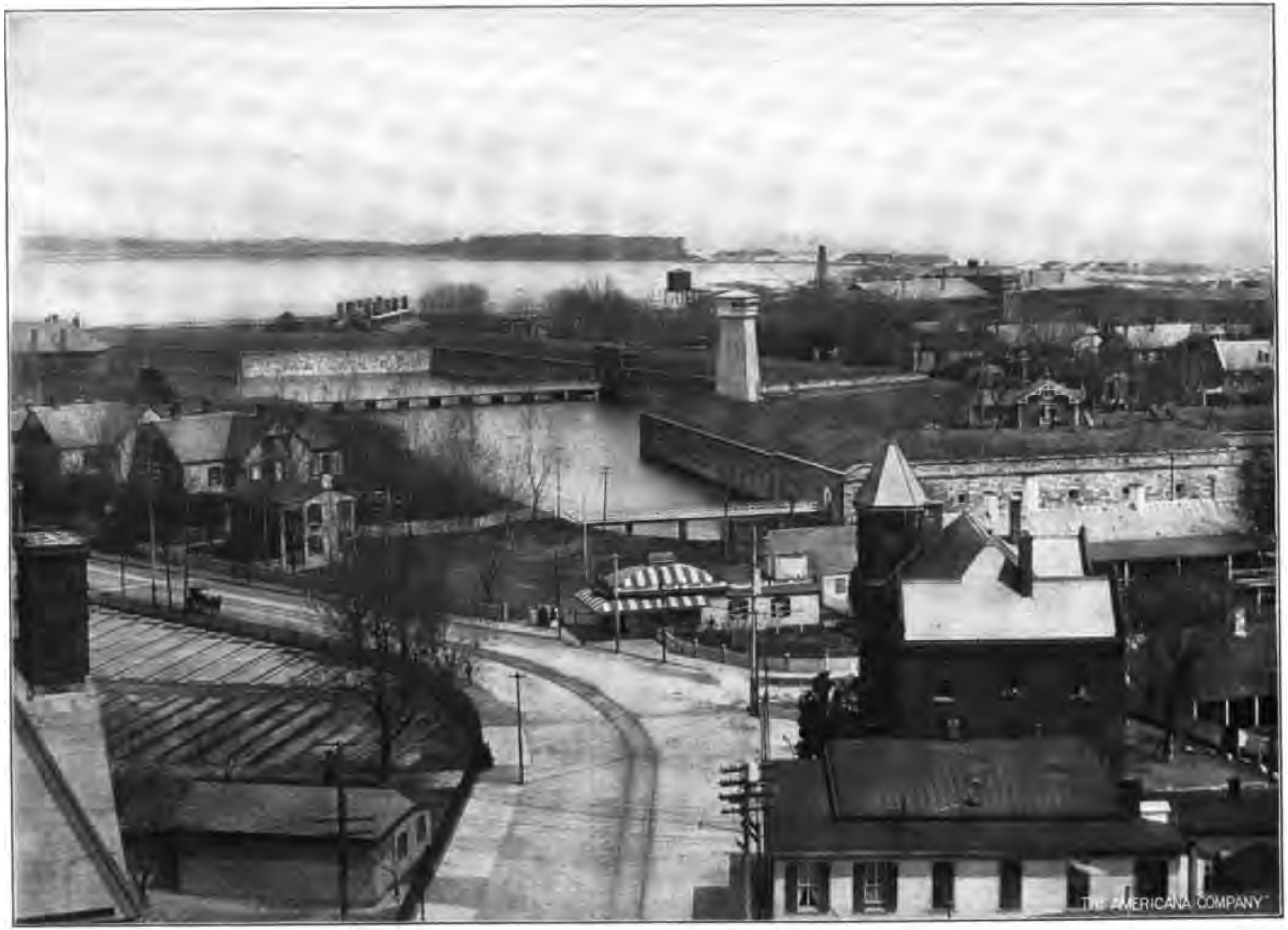
FORT McALLISTER, an earthwork erected by the Confederates at Genesis Point as one of the defenses of Savannah. It was 12 miles south of the city and six miles from Ossabaw Sound. On 27 Jan. 1863 Admiral Dupont attacked it with five vessels, and again on 1 February, but without effect. On 3 March three monitors, under command of Commodore Drayton, bombarded it, but did little injury. When Sherman, marching from Atlanta, appeared before Savannah the fort prevented communication between his army and the Union fleet, and Hazen's division of the Fifteenth corps was ordered to assault it. Hazen reached the vicinity of the fort about 11 A.M., 13 Dec. 1864, drove in the Confederate skirmishers, and at 4.15 P.M. had deployed nine regiments within 600 yards of the work. At that time the bugle sounded, and the line went forward over exploding torpedoes and under a close and severe fire of artillery and musketry, carrying the fort at 5 P.M. and capturing its garrison of about 250 men, 22 guns and a large amount of ammunition. The Union loss was 24 killed and 110 wounded. The Confederate loss was about 50 killed and wounded.

FORT McHENRY, Md., former United States military post, established in 1794. It was located on Whetstone Point, Patapsco River, about three miles from Baltimore. It was first occupied by the military in 1775 and was made a permanent fortification in 1794. In September 1814, it was bombarded by the British fleet under Admiral Cockburn but without result. 'The Star Spangled Banner' was written under the inspiration of the heroic defense of the fort on this occasion. It was used as a rendezvous and military prison. See BALTIMORE, MD., ATTACK ON.

FORT MACON, N. C., a work commanding Beaufort Harbor, constructed of brick and stone, and mounting nearly 50 guns. It was seized by Governor Ellis, of North Carolina, about the middle of April 1861. After Burnside's capture of Newbern, 14 March 1862, General Parke was sent to reduce the fort, then garrisoned by about 450 men. Parke captured Moorehead City and Beaufort, and then proceeded to invest the fort. He cut off its communications, planted 11 siege-guns, and at 5.40 A.M. 25 April, in co-operation with four vessels of the navy, opened fire, and at 4 P.M. the fort surrendered with its entire garrison. Parke occupied it next morning and it remained in Union possession until the close of the war.

FORT MADISON, Iowa, city and county-seat of Lee County, 18 miles from Burlington, on the Chicago, Burlington and Quincy and the Atchison, Topeka and Santa Fe railroads and the Mississippi River. Here is the State penitentiary and the Cattermole Memorial Library, the Santa Fe and Sacred Heart hospitals and several public parks. The Mississippi is crossed by a great railroad and street bridge here. The city's industries comprise a pork-packing-house, railroad shops, grain elevators, brickworks, cement-block works, foundries and machine shop, flour and saw mills, farm implement works, wrapping-paper mills, heater works and manufactures of over-gaiters, buttons, boots and shoes, furniture, canned goods, fountain pens, boxes, tools, etc. The government is vested in a mayor and council. There was a fort here as early as 1808, but was abandoned in 1832 when the town was established. Pop. 9,507.

FORT MEADE, a Federal military station at Sturgis, S. D. It was established in 1878 during the period when Indian forays were frequent in the border country. The reservation comprises 7,842 acres and is reached by the Fremont, Elkhorn, and Missouri Valley



FORTRESS MONROE, OLD POINT COMFORT, VA.

Railroad. The defensive works were reconstructed in 1902.

FORT MEIGS, mĕgz, Ohio, a former fort on the Maumee River, where the Americans made a gallant defense during the War of 1812 against the British and Indians. General Harrison constructed the fort in February 1813 and in the following May it was attacked by a force of 2,200 British and Indians under General Proctor. After a heroic defense of five days reinforcements arrived with General Clay and on 9 May General Proctor retreated. He made a second attempt to take the fort on 20 July but the defection of his Indian allies obliged him to relinquish the attack. Consult Lossing, 'Pictorial Field Book of the War of 1812' (New York 1869), and Slocum, 'The Ohio Country between the Years 1783–1815' (ib. 1910). See Frenchtown, Mich.

FORT MERCER, N. J., former fort at Red Bank, on the Delaware River, that figured somewhat prominently in the Revolution as one of the defenses of the city of Philadelphia. In 1777 Sir William Howe saw that for him the capture of Fort Mercer had become imperative, if he continued to occupy the city of Philadelphia, as otherwise he would be cut off by the water route from New York and would be practically in a state of siege. He made an attack, accordingly, late in October, with 2,500 Hessians who were supported by the fleet. The garrison was at length obliged to withdraw when Fort Mifflin fell. The fortifications were razed by the British. Consult Lowell, 'The Hessians in the Revolutions' (New York 1884).

FORT MIFFLIN, Pa., a United States military post on Mud Island in the Delaware River, near the mouth of the Schuylkill River. It was built in 1771 as one of the defenses for Philadelphia. It figured in numerous engagements in the Revolution. Because it shut off the British in Philadelphia from communication by water with New York, Sir William Howe decided to attack it and also Fort Mercer. On 23 Oct. 1777 it was bombarded for several hours, but with little effect by a British fleet. Finally the British erected a strong battery on Province Island and greatly reinforced their fleet. On 10 November they again attacked and after an almost constant bombardment for six days the Americans evacuated the fort and crossed over to Fort Mercer. Consult Wallace, 'An Old Philadelphian, Colonel William Bradford' (Philadelphia 1884), and Dawson, 'Battles of the United States' (New York 1858).

FORT MIMS, Ala., Massacre of, a massacre of whites by Creek Indians at Fort Mims, a temporary stockade, 35 miles north of Mobile, Ala., 30 Aug. 1813. When the war began there gathered within the stockade 553 persons led by Dixon Bailey. The latter was warned of an impending attack but nevertheless a great force of Indians succeeded in surprising the improvised garrison. Of 553 men, women and children only 15 whites escaped slaughter while the Indians made captive some negroes and mestizos. Consult Pickett, 'History of Alabama' (Charleston 1851); Lossing, 'Field Book of the War of 1812' (New York 1869); and Dawson 'Battles of the United States' (ib. 1858).

FORT MONROE, Va., United States military post at Old Point Comfort, commanding the entrance to Hampton Roads. It is the headquarters of the coast defenses of Chesapeake Bay. There are a post office and telegraph station at the post, which includes a reservation of 282 acres. The station of the Artillery School (post-graduate), with quarters for 100 officers and 900 men, is located here. Jefferson Davis (q.v.) was kept a prisoner here for two years after the Civil War.

FORT MORGAN, Ala. See Fort Gaines and Fort Morgan.

FORT MOULTRIE, mōl'trĭ, S. C. When Major Anderson transferred his garrison from Fort Moultrie to Fort Sumter, 26 Dec. 1860, he spiked and dismounted the 52 guns of the fort and burned the gun carriages. The South Carolina authorities took possession of the fort on the 27th, remounted the guns, strengthened the work, increased its armament, and it became one of the strong defenses of Charleston Harbor, resisting all efforts of the Union fleet to pass it, or reduce it, and remained in Confederate possession until the evacuation of Charleston and all the forts in the harbor 17–18 Feb. 1865. See Fort Sumter; Fort Wagner. For early history see Fort Sullivan.

FORT NECESSITY. After the capture of Jumonville's force (see Great Meadows), Washington threw up earthworks and made a stockade fort, which he named as above. It soon became crowded with Indians and colonial companies, and a South Carolina company of regulars under Captain Mackay; and Washington left the latter in command and moved 13 miles farther on, where was a small settlement. But the place was indefensible; and after summoning Mackay and his men it was decided to retreat to Fort Necessity. The next morning the French were upon them, 900 men besides Indians. Washington led out his men to battle, but the enemy kept off and fired from the woods, in a heavy rain. Washington withdrew his men behind the low, flimsy embankment; and after an entire day of mutual firing, with heavy loss on both sides, the French proposed a parley. The English were at the last extremity, with food and ammunition nearly exhausted, and guns in bad condition; and Washington would not consent to let them send an officer to his camp to observe this, and only yielded when they proposed to have him send one to theirs. The French terms were that the English should retire with all their baggage except artillery, agree to build no more forts beyond the Alleghanies for a year, return the Jumonville prisoners and leave two officers with the French as hostages. The terms were accepted; but had the French held out a few hours more they could have killed or captured the entire force.

FORT NIAGARA, N. Y. As early as 1669 La Salle built a stockade at the mouth of the Niagara River, and Fort Conti, a fortified trading post, was built here 10 years later. In 1686 it was called Fort Dehonville and in 1725 it was named Fort Niagara. In July 1759 it was captured by the British and Indians under Johnson. (See Colonial Wars). Here, in 1764, Sir William Johnson made treaties with several tribes of Indians. During the struggle for independence many expeditions started westward from this point and John Butler and

Joseph Brant at different times made their headquarters here. The British abandoned the fort in 1796 under the stipulations of the Treaty of Paris of 1783, and an American garrison took immediate possession. In the War of 1812 it was bombarded and captured by the British on 19 Dec. 1813. In 1815 it again became an American station. Becoming of no importance as a strategic point it was abandoned in 1826. Consult Porter, 'A Brief History of Old Fort Niagara' (Niagara Falls 1896); Marshall, 'The Niagara Frontier' (1865); Emerson, 'The Niagara Campaign of 1759' (2d ed., ib. 1909).

FORT NINETY-SIX, S. C. See NINETY-SIX.

FORT PAYNE, Ala., city and county-seat of De Kalb County, on the Alabama Great Southern Railroad, 92 miles northeast of Birmingham. It has large coal and iron industries and also brick and cooperage plants and a hosiery mill. Pop. 1,317.

FORT OGLETHORPE, a Federal military station situated at Dodge, Ga., about 10 miles from Chattanooga, Tenn. After the entrance of the United States into the World War, in 1917, great numbers of Germans, mostly crews of the liners seized in American harbors, were interned at Fort Oglethorpe for the duration of the war.

FORT PICKENS, a strong work on Santa Rosa Island, Fla., commanding the entrance to Pensacola harbor, and with forts Barrancas and McRee opposite, defending the harbor and United States navy yard at Warrington. Early in January 1861 it was under command of Lieut. A. J. Slemmer and practically unoccupied, Slemmer, with a small garrison, being at Fort Barrancas. Fearing that the Secessionists would seize the fort, Slemmer, 10 January, transferred to it his garrison of 81 men from Barrancas, and on the 12th the governor of Florida seized forts Barrancas and McRee, with 175 heavy guns, also the navy yard, and demanded the surrender of Fort Pickens, which was refused. A second demand was made on the 15th and a third on the 18th, both of which were refused. Slemmer strengthened the work and held it until relieved by the arrival of reinforcements 12–13 April, when Col. Harvey Brown assumed command. Additional reinforcements were sent, and in June a regiment of New York troops, known as Wilson's Zouaves, was landed on Santa Rosa Island and encamped. On 9 October a body of Confederate troops, that had crossed from Pensacola and landed on the island during the night, surprised the camp of the Zouaves, and drove them back toward Fort Pickens, but the Zouaves being reinforced by four companies from the fort, the Confederates were driven in disorder to their vessels, with a loss of about 90 killed, drowned and wounded. The Union loss was 67 killed, wounded and captured. No other serious attempt was made upon the fort, which remained in the possession of the United States government.

FORT PILLOW, constructed by the Confederates on the east bank of the Mississippi, about 40 miles above Memphis. It was bombarded by the Union fleet in its descent of the river and attack upon the Confederate fleet near Memphis, abandoned by the Confederates 4 June 1862, and 5 June was occupied by a small Union force. On 12 April 1864 it was garrisoned by parts of the second and fourth (colored), United States Artillery, and a detachment of the 13th Tennessee Cavalry, in all 557 men, with six guns, under command of Maj. L. F. Booth. At daybreak of the 12th Gen. J. R. Chalmers of Forrest's cavalry command appeared before the fort with about 1,500 men, and after some hours of hard fighting drove the Union troops from their advanced rifle-pits back into the fort, which was attacked, and the Confederates repulsed, but securing a sheltered position within 100 yards of it. Forrest had come up while the fighting was in progress, and at 3.30 P.M. demanded the surrender of the fort, saying that he had sufficient force to take it, and would not be answerable for consequences should he be compelled to assault. Major Booth had been killed, but in his name an hour was asked for consideration. There were United States gunboats in the river, and believing that the request for an hour's consideration was to gain time for reinforcements to arrive, Forrest would give but half an hour. When the time was up the bugles sounded the charge, the assault was made, there was a short and severe struggle, many of the garrison were killed in the fort, and those who attempted to escape by the river were shot or, rushing over the bluff into the river, drowned. More than half of the garrison were killed or wounded, a very large proportion being killed. About 160 white and 40 colored prisoners were taken. The defenders of the fort fought bravely, but were simply overpowered. Forrest says in his report: "The river was dyed with the blood of the slaughtered for 200 yards. The approximate loss was upwards of 500 killed; but few of the officers escaped. There was in the fort a large number of citizens who had fled there to escape the conscript law. Most of them ran into the river and were drowned." Forrest reports his own loss as 20 killed and 60 wounded. Consult 'Official Records' (Vol. XXXII); The Century Company's 'Battles and Leaders of the Civil War' (Vol. IV).

FORT PLAIN, N. Y., village in Montgomery County, 35 miles southeast of Utica on the Barge Canal, and on the New York Central and Hudson River Railroad. It contains machine shops, furniture factories, creameries, wagon works, piano factory, condensed milk factory and silk and knitting mills. The water supply system is the property of the village. Pop. 2,923.

FORT PORTER, N. Y., United States military post on the Niagara River in the city of Buffalo. It was established in 1867, but prior to that date the government maintained a defensive work at Black Rock.

FORT PREBLE, Me., United States military post, at Spring Point, in Portland Harbor, established in 1808.

FORT PULASKI, erected by the United States on Cockspur Island, for the defense of Savannah, Ga., and commanding both channels of the Savannah River. It was a brick work, with walls seven and a half feet thick and 25 feet high above water. It was seized by Georgia State troops 3 Jan. 1861 and in January 1862 mounted 48 heavy guns and was garrisoned by nearly 400 men. Gen. Q. A. Gillmore was put in charge of operations to reduce it, and in February 1862 two regiments of infantry, two companies of engineers and two of artillery were landed on Tybee Island, mostly a mud-marsh, lying southeast of the fort, and soon constructed 11 batteries of 36 heavy guns, at distances from the fort varying from 1,650 to 3,400 yards. Causeways had to be constructed across marshes, over which mortars of 17,000 pounds were moved; the work was done entirely at night; all difficulties were overcome; and on 9 April the batteries were ready to open fire, the three breaching batteries being established at a mean distance of 1,700 yards from the fort. At sunrise of the 10th the fort was summoned to surrender; its commander, Col. C. H. Olmstead, replied that he was there "to defend the fort, and not to surrender it." Fire was opened at 8 A.M., and an hour later all the batteries were in full play, the Confederates replying vigorously, the fire continuine on both sides until dark. Firing was resumed at sunrise on the 11th, and the Confederates replied steadily; but by noon several of the guns were dismounted; the walls of the fort began to crumble under the weight of metal; and at 2 P.M. the white flag was raised, firing ceased, and 385 officers and men were surrendered, several of whom were severely, one mortally, wounded. The Union loss was one man killed. The result of the fall of Fort Pulaski was the closing of the Savannah River to blockade runners.

FORT RILEY, Kan., United States military post on the Kansas River, near Junction City, Kan. It was established in 1852 on a reservation of 19,000 acres and was first called Camp Centre, being near the geographical centre of the United States but was subsequently named after Gen. B. C. Riley, U. S. A. It is about 140 miles from Fort Leavenworth, with which place it is connected by a military road completed in 1854. An appropriation of $100,000 was made by Congress in 1855 for the extension of this road to Bridger's Pass, between Nebraska and Utah, making it one of the finest roads in the country. The fort is the seat of the United States Cavalry and Field Artillery School and has accommodations for a large force of cavalry and infantry.

FORT ROBINSON, Neb., United States military post in the Red Cloud Agency, situated in the western part of Dawes County, and on a fork of the White River, about three miles southeast of Crawford. The post dates back to 1874 and occupies about 20 square miles. There are accommodations for over 500 troops, with stables for the same number of horses.

FORT ROYAL, West Indies. See FORT DE FRANCE.

FORT SAINT DAVID, a ruined fortress now included within the modern municipality of Cuddalore, in the presidency of Madras, Hindustan, on the Coromandel coast, situated on the Tripapolore River about 12 miles south-southwest of Pondicherry. It was besieged by the French in 1746, but withstood the siege and finally forced the French to retire. It remained in possession of the British and was the capital of their possessions in that section of India until 1758, when the French army under General Lally again attacked the fort, this time with success, and razed the fortifications. Abandoned by them in 1760, it was reoccupied by the British, again captured by the French in 1782, and successfully withstood a siege in the following year, falling permanently into British possession in 1785.

FORT SAINT PHILIP, La., a fort lying on the Mississippi River about 80 miles below New Orleans and nearly opposite Fort Jackson. The Spaniards originally built the old river front and it was not until the War of 1812 that the works were entirely enclosed by the United States government. Extensive alterations were made by the government after 1841. At the outbreak of the Civil War it was taken by the Confederates, but fell before the attack of Admiral Farragut's fleet in April 1862. See FORT JACKSON AND FORT SAINT PHILIP; NEW ORLEANS, CAPTURE OF.

FORT SAM HOUSTON, hūs'tŏn, Tex., United States military post near San Antonio, established 1865. There is a reservation here of 469 acres. It is a valuable strategic point on the Southern frontier. There is a post office at the post.

FORT SANDERS. See KNOXVILLE, SIEGE OF.

FORT SCHUYLER (Old), N. Y. See FORT STANWIX; ROME, N. Y.

FORT SCHUYLER, a Federal military station, situated on a 52-acre reservation at Throgg's Neck, Bronx County, N. Y. It was established in 1856 and forms one of the northern defenses of New York Harbor, its guns governing the passage of the Long Island Sound.

FORT SCOTT, Kan., city and county-seat of Bourbon County, on the Marmaton River, and on the Saint Louis and S. F., the Missouri, K and T. and the Missouri P. railroads, 100 miles south of Kansas City. The chief income of the city is derived from the railroad shops, the Saint Louis and S. F. employing 500 hands and the Missouri Pacific 550 hands. The city is situated in a rich agricultural and dairy region, this in itself a valuable source of income. Besides these industries there are manufactories of cement, syrup, brick, flour and machinery. The United States census of manufactures for 1914 showed within the city limits 33 industrial establishments of factory grade, employing 527 persons; 422 being wage earners receiving annually in wages a total of $247,000. The capital invested aggregated $892,000, and the year's product was valued at $1,580,000; of this, $496,000 was the value added by manufacture. Fort Scott is the largest horse and mule market in the State. There are three banks with a combined capitalization of $200,000. Among the public institutions are the library containing over 20,000 volumes, the Goodlander Home for Children, the old government fort buildings which have been preserved, the National cemetery and a 160-acre natural public park. Religious services are held in 11 church edifices. The educational system is excellent, consisting of a high school and seven public schools. There are two commercial colleges in the city. The city was first settled as a military post in 1844, became a municipality in 1850 and was chartered as a city of the first class in 1882.

The public administration is vested in a mayor and four commissioners who are elected every two years. The major portion of the population are native born, with a sprinkling of negroes, Germans, Jews and Irish. Pop. 11,442.

FORT SHERIDAN, Ill., is 26½ miles north of Chicago and 59 miles south of Milwaukee, Wis., on the shore of Lake Michigan, 119 feet above the level of the lake. The occurrence of the railroad riots of 1877 and the Haymarket riot in 1886 alarmed some of the business men of Chicago, who foresaw that the city might be at the mercy of any mob that found a leader. Mr. A. C. Bartlett as their representative purchased 632½ acres in Deerfield township and presented it to the government in 1886. It was accepted by the Secretary of War, 19 Nov. 1887. Later two plots of land, one containing 84 and the other 71 acres, were added by purchase to the reservation. The buildings erected on it have cost nearly $2,000,000. It was first occupied by United States troops 8 Nov. 1887 when it was garrisoned by two companies of the Sixth Infantry. It was officially named, by order of the President, Fort Sheridan, 27 Feb. 1888, in honor of Lieut. Gen. Philip Henry Sheridan. It was a centre of interest in the Spanish-American War. In 1917 it was used as a Reserve Officers' Training Camp for men from Illinois, Michigan and Wisconsin.

FORT SILL, Okla., a United States military post in Comanche County, on the Chicago, Rock Island and Pacific Railroad, 90 miles southwest of Oklahoma City. A railway station, telegraph office and post office are located here. The buildings of the permanent post were erected in 1869–70. The ground was staked off by Gen. Philip H. Sheridan, who named the post in honor of Gen. Joshua Sill, who was killed at the battle of Stone River, Tenn., 31 Dec. 1862. In the seventies the post was the scene of considerable military activity and here came most of the Comanches and Kiowa Indians to surrender after the failure of their last general outbreak in 1874–75. In the eighties, Geronimo, the Apache chief, was brought to Fort Sill and kept there as a prisoner of war. New buildings were erected in 1909–10, and in 1917, one of the great cantonments of the new National Army was established at Fort Sill and named Camp Doniphan. Consult Thoburn, J. B., 'Fort Sill' (in *Oklahoma Home and School Herald,* April 1918).

FORT SLOCUM, a Federal military station, 2 miles from New Rochelle, N. Y., on Long Island Sound and forming an outer defense of New York Harbor. It has a post office and telegraph station, also a recruit depot.

FORT SMITH, Ark., city and county-seat of Sebastian County, situated on the western border of the State at the junction of the Arkansas and Poteau rivers, and on the Saint Louis and San Francisco, Missouri Pacific, Kansas City Southern, Midland Valley and other railroads. The city is in a rich agricultural region and derives a greater part of its income from this source. There are also coal mines near by. The city has a wagon factory, several furniture and chair factories, a wood-working establishment, machine shops, cotton compress and oil wells, manufactories of dry goods, drugs, leather goods and a trade in coal, corn, cotton. There are two daily and several weekly papers published. The city has eight public schools, a high school, two commercial colleges, a Catholic Girls' Academy, three parochial schools and two conservatories of music. There are 13 churches, representing nearly all denominations. There are four banks (three national and one savings), having a combined capital of $900,000. Among the notable public buildings are the Federal and county courthouses, the United States jail and a hospital, Saint Anne's Academy, Carnegie library, city park and an opera-house. A National cemetery is located on the site of the former "Post" burying ground. Fort Smith was originally a French trading post, and in 1817 became the headquarters for the gathering and distribution of supplies for the United States army in the Southwest. It was called Belle Point by the early settlers, was incorporated in 1842, and received its city charter in 1886. The city adopted the commission form of government in 1913. The city is lighted by electricity, gas and natural gas, owns its own waterworks and possesses an excellent system of electric railways. Pop. 28,638.

FORT STANWIX, N. Y., a former fort near the present site of Rome, N. Y., originally built in 1756, but abandoned, and rebuilt in 1758 by Brigadier Stanwix. Here in the fall of 1768 a treaty was negotiated by Sir William Johnson (q.v.), the British superintendent-general of Indian affairs in North America, with the Six Nations, about 3,200 Indians being present. For the sum of $10,000, the Indians surrendered title to Kentucky, West Virginia and western Pennsylvania. Soon after this the fort was again abandoned, but in 1776 it was once more rebuilt and named after that intrepid old officer, Gen. Philip Schuyler. In 1777 the fort was the object of an attack by General Saint Leger with 1,700 British soldiers and allies, but the garrison held out for 19 days, from 3–22 August when they were relieved by a force of Continentals under General Arnold. In 1781 the fort was destroyed by flood and fire, and when rebuilt was again named Fort Stanwix. It was here on 22 Oct. 1784 that the three United States commissioners negotiated the treaty with the Iroquois Indians, known as the "Treaty of Fort Stanwix," which provided for the cession to the United States of Western lands claimed by them. Consult Sloane, W. M. 'The French War and the Revolution' (New York 1901).

FORT STEDMAN, Assault on. In March 1865 General Lee prepared to abandon Richmond and Petersburg, unite with Johnston at Danville, and attack Sherman, who was marching northward from Savannah. In order that he might wait for favorable weather, he decided on a sortie against Grant to hold him near the Appomattox. The sortie was committed to General Gordon, with about one-half of the army. The point of Gordon's attack was Fort Stedman. At 4 A.M. 25 March the attack was made, and a rush of Gordon's men overcame the pickets and advance guards, took from 400 to 500 yards of the main line (Willcox's), including Fort Stedman, the defenders of which, after a spirited resistance, were overpowered and captured, turned its artillery upon the Union line, captured between 500 and 600 prisoners, and endeavored to sweep down the intrenchments, but met with a repulse. It was so dark that friend could not be distinguished from foe, but General Parke ordered Willcox to recapture the works, General Hartranft to support him. By 7.30 A.M. Parke had regained a part of the line and drawn a cordon around Fort Stedman, and Tidball's artillery had concentrated a heavy fire upon it and the line adjacent. Hartranft advanced at 7.45 A.M., attacked detachments of the enemy that were moving in the direction of City Point, capturing or driving them back, and at 8 A.M. Fort Stedman and the entire line was recaptured, together with 1,949 prisoners and nine stands of colors, the Federal loss (Ninth corps) being 72 killed, 450 wounded and 522 missing. The Sixth corps now attacked and captured the Confederate picket-line, losing 449 killed and wounded and 30 missing; and the Second corps did the same, capturing 365 prisoners, and losing 51 killed, 462 wounded and 177 missing. The Confederates made several efforts to recapture their own advanced lines but failed. The entire Union loss in this engagement was 170 killed, 1,323 wounded and 729 missing, an aggregate of 2,222. The Confederate loss is not definitely known; General Meade estimates it at 5,000 men; it was probably not more than 4,000, of whom one-half were prisoners. Consult 'Official Records' (Vol. XLVI); Humphreys, 'The Virginia Campaign of 1864–65'; Walker, 'History of the Second Army Corps'; Powell, 'History of the Fifth Army Corps'; The Century Company's 'Battles and Leaders of the Civil War' (Vol. IV).

FORT STEPHENSON, Ohio. See FREMONT, OHIO.

FORT STEVENS, Ore., United States military post situated in the extreme northwestern part of the State at the mouth of the Columbia River, and on the Seattle, Spokane and Portland Railway. It is a little more than 100 miles northwest of Portland and about nine miles west of Astoria, the fur trading post, which was established by John Jacob Astor in 1811. The grounds surrounding the post which was established in 1864 comprise 1,250 acres, and, beside the quarters for the officers and artillerymen stationed there, has a post office and railroad station.

FORT SULLIVAN, S. C., the early name of Fort Moultrie, in Charleston Harbor; notable for its defense against the British in the Revolutionary War. See COLONIAL WARS; CHARLESTON, S. C., ATTACKS ON.

FORT SUMTER, built upon a shoal in the narrowest part of the channel of Charleston Harbor, three and a half miles from the city and three-fourths of a mile from the north end of Morris Island, was constructed on a rip-rap foundation, its walls of brick being 38 feet high and 7½ feet thick. When South Carolina seceded, the fort was unfinished and not garrisoned, but men were engaged in the work and in mounting guns. South Carolina passed an ordinance of secession on 20 Dec. 1860, and the Secessionists looked to the immediate possession of all the forts in the harbor, one of which, Fort Moultrie, was held by Maj. Robert Anderson, with a garrison of 75 men. Fort Moultrie was indefensible from a land attack, and Anderson, believing that he was about to be attacked, on 26 December, skilfully transferred his command to Fort Sumter, the strongest and most inaccessible work in the harbor. Governor Pickens demanded Anderson's immediate return to Fort Moultrie. Anderson refused, and the governor took possession of Fort Moultrie and all other works in the harbor, and seized the arsenal, post office and custom house in Charleston, raised the Palmetto flag over them, and thus inaugurated war against the United States. He began the construction of batteries on James, Morris and Sullivan Islands to command the harbor and reduce Fort Sumter. On 9 Jan. 1861 the merchant steamer *Star of the West* endeavored to land reinforcements and provisions for Fort Sumter, but was fired upon by the Secession batteries and driven back. Again Governor Pickens demanded the surrender of the fort, again Anderson refused, and negotiations were transferred to Washington. The construction of batteries continued and 1 March General Beauregard was assigned to the command of all the Confederate forces at Charleston, with instructions to perfect preparations for reducing Fort Sumter. Anderson was now in danger of being starved out and, in accordance with promise given, Governor Pickens, was informed 8 April by a special messenger sent by President Lincoln, that an attempt would be made to land provisions, and provisions only, at Fort Sumter. Beauregard notified the Confederate government, and received orders 10 April to demand the evacuation of the fort, and to reduce it if refused. The demand was made at noon of the 11th. Anderson refused, but made the casual remark to the messengers carrying Beauregard's demand that, if left alone, he would be starved out in a few days, and Beauregard, «to avoid effusion of blood,» asked when he would be ready to leave the fort. Anderson said he would evacuate the fort by noon of the 15th, should he not prior to that time receive «controlling instructions» from his government or «additional supplies.» The reply was not satisfactory, and 3.20 A.M. of the 12th Anderson was notified that fire would be opened within an hour. At 4.30 A.M. the signal-gun was fired from Fort Johnson on James Island; all the batteries opened fire; Anderson replied deliberately; in 24 hours 2,500 shot and shell struck the fort or fell inside of it; the barracks were burned and the fort much damaged; the relieving fleet could not land; and on the afternoon of the 13th terms were arranged under which, on the afternoon of the 14th, Anderson saluted his flag and, with drums beating and colors flying, marched with his garrison out of the fort, was conveyed to a steamer and sailed for New York. During the bombardment not a man was killed on either side.

When Fort Sumter fell into Confederate possession it had 78 serviceable guns. Additional guns were mounted in it and it was well garrisoned. The Union authorities sunk a number of old whalers filled with stones in the main channel of Charleston Harbor to close the port to blockade-runners, and a blockading force was maintained off the harbor; but it was not until 7 April 1863 that any serious operation was attempted against the fort. Then

Dupont, with nine ironclads, made an unsuccessful attack upon it. One of the ironclads, the *Keokuk*, which had approached nearest to the fort, was struck 90 times, and so much injured that she sunk off Morris Island, and her armament fell into the hands of the enemy, while the others withdrew after an engagement of 40 minutes, most of them disabled by the fire of the 69 heavy guns brought to bear upon them. The fleet fired 151 shots, not more than 34 of which struck the walls of the fort. Sumter discharged 810 shot, Fort Moultrie and other batteries 1,399, in all 2,209, of which 520 struck the different vessels. It had been expected that the fort would be reduced to a pile of ruins before the sun went down, but the result convinced the Union authorities that the fort and adjoining works could not be reduced by a purely naval attack.

It was now determined that Fort Sumter and Charleston should be taken by combined land and naval attacks, the land attack being by the way of Morris Island, the capture of the batteries there and the establishment of batteries to reduce Fort Sumter. For this purpose General Gillmore was selected. He landed on Morris Island 10 July, made two unsuccessful assaults on Fort Wagner, 11 and 18 July, and then concluded to attempt the destruction of Sumter from ground already in his possession, so that the fleet could enter the harbor and command Charleston. (See FORT WAGNER). A sufficient number of breaching-guns were in readiness 16 August; fire was opened on the 17th, and on the 24th Gillmore reported the practical demolition of the fort. From 18 guns he had thrown 5,009 projectiles, weighing 552,683 pounds, of which 4,147 struck the fort. Before daylight 23 August five monitors approached to within about 800 yards of the fort and opened fire, which was kept up until 6 A.M. Confederate officers now held a council, and the proposition was offered to abandon the fort, but as a matter of sentiment it was resolved to hold it. On 30 August Gillmore resumed fire, dismounting the remaining barbette guns and leaving but one casemate gun serviceable. As a means of defense against the fleet the fort was entirely useless, and it was held merely as an infantry outpost. On 2 September six monitors opened fire on it, but it remained silent, not a single gun being in working order to reply. Early on the morning of 7 September, after the abandonment of Fort Wagner, Admiral Dahlgren demanded the surrender of Fort Sumter, which was refused. Meantime the Confederates were removing the guns from the fort and placing them in other parts of the harbor. During the night of 8 September a naval force of about 400 men, under Commander F. H. Stevens, attempted to carry the fort by assault. It was then defended by about 450 men, under command of Maj. Stephen Elliott, Jr. Stevens' men were in boats, and when towed within 800 yards of the fort the boats were cut loose and rowed for the fort, on approaching which they were met with a fire of musketry; as the men landed, hand-grenades and shells were thrown upon them; and simultaneously, at a signal from the fort, all the Confederate batteries on James and Sullivan Islands, with one of their gunboats, opened fire, and the attack was repulsed, all who had landed being killed or taken prisoners. The reported loss was 4 killed, 19 wounded and 102 captured. On 26 October Gillmore again opened fire with his heavy guns from forts Wagner and Gregg, aided by the cross-fire of 150-pound rifles on board the fleet, which completed the ruin of the fort, and all aggressive operations for the season against Charleston ended, although a desultory fire was kept up against Sumter during November and December to prevent the remounting of the guns. The casualties in the fort from 12 Aug. to 11 Dec. 1863 were 43 killed and 165 wounded. From a tabular statement prepared by an officer in the fort it appears that from 12 Aug. to 31 Dec. 1863, 26,867 shot were fired at it, 19,808 falling against or into it. On the approach of Sherman's army the fort was evacuated 17 Feb. 1865, and 14 April following the same flag that Anderson lowered in 1861 was raised over it with imposing ceremonies. Consult 'Official Records' (Vols. I, XXVIII); Doubleday, 'Reminiscences of Forts Sumter and Moultrie'; Crawford, 'Genesis of the Civil War'; Gillmore, 'Engineer and Military Operations Against Charleston in 1863'; The Century Company's 'Battles and Leaders of the Civil War' (Vols. I and IV); 'Naval War Records' (Vol. XIV).

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FORT TOTTEN, N. Y., United States military post, established in 1862 at Willett's Point, on Long Island Sound, near Whitestone, and strategically placed at the western end of Long Island Sound. The School of Submarine Defense and the torpedo supply depots are situated here. The fort guards the northern entrance to New York Harbor. The entire military reservation here has an area of 136 acres.

FORT VALLEY, Ga., city of Houston County, on the Central of Georgia and the Southern railroads, 28 miles south of Macon. It has cotton gins, cotton and yarn mills and a crate factory. The city owns the water supply system and electric-lighting plant. Pop. 2,697.

FORT WADSWORTH, N. Y., United States military post on Staten Island, at The Narrows, in New York Bay. It was established in 1827, and was first called Fort Richmond. The post office is Rosebank, N. Y., and the telegraph station is Quarantine, Clifton, S. I. It was named for Gen. J. S. Wadsworth, who was killed in the battle of the Wilderness in 1864.

FORT WAGNER, a work constructed by the Confederates near the north end of Morris Island, a low, narrow, sandy strip of land, about three and a half miles in length, on the south side of Charleston Harbor. It was 2,600 yards directly south of Fort Sumter, to which it was an outpost, and was constructed to hold and control all that portion of the island upon which effective breaching-batteries against Fort Sumter could be established. On the northern end of the island was Fort Gregg, and the southern end was held by a small force of infantry and artillery. Preparatory to a combined naval and land attack on Fort Sumter and Charleston, it was determined to reduce Fort Wagner and take possession of the entire length of Morris Island, and General Gillmore, an engineer officer of skill, was selected to command the land forces. On 10 July 1863, Gillmore, who had concentrated 6,500 men and secretly placed 47 siege guns and field guns in position on the extreme northern end of Folly Island, attacked the Confederate position on the south end of Morris Island, effected a landing, carried the Confederate batteries of 11 guns and by 9 A.M. occupied three-fourths of the island and pushed his skirmishers to within 600 yards of Fort Wagner. The navy assisted with four ironclads. At daylight of the 11th an attempt was made to carry the fort by assault, which failed, with a Union loss of 172 killed and wounded, and 119 taken prisoners, of whom 40 were wounded. The Confederate loss was 12 killed and wounded. After this failure counter-batteries were established against the fort, and it was determined to attempt, with the aid of the ironclads, to dismount its guns, and either drive the Confederates from it, or open the way to a successful assault. The navy kept up an almost incessant fire upon it, and the land batteries were established at distances ranging from 1,330 to 1,920 yards of it. Soon after midday of the 18th the navy and 41 light guns and siege-mortars opened a furious fire upon the fort, which was continued until nearly all its guns were silenced and its defenders driven into bomb-proofs, when about sunset, after 900 shot and shell had been discharged, Gen. G. C. Strong's brigade of six small regiments, supported by Col. H. S. Putnam's brigade of four regiments, made an assault. As the head of the column left the trenches the guns of forts Wagner, Gregg and Sumter opened on it, and as it neared Fort Wagner the Confederates mounted the parapet and poured in such a destructive fire of musketry that the leading brigade was repulsed; but the supporting brigade gained a foothold, which it kept for over an hour, when it was driven back. The Union loss in this second assault was 1,128 killed and wounded, and 389 missing; among the killed or mortally wounded being General Strong and Colonel Putname, John L. Chatfield, and Robert G. Shaw (q.v.). The Confederate loss was 56 killed and 133 wounded.

Gillmore now turned his attention to Fort Sumter (q.v.), which, with the aid of the navy, was, by 23 August, reduced to a shapeless mass with almost every gun dismounted or silenced. Meanwhile regular approaches were made against Fort Wagner, thousands of heavy shells were thrown against and into it, and by 26 August the trenches were within 250 yards of it, the intervening space being a flat ridge of sand, scarcely 25 yards wide, and for a great part planted with torpedoes. The Confederates were driven from position behind this flat ridge and the approaches continued until within a few yards of the fort, when the heavy guns of the army and navy opened on it. Final operations were inaugurated 5 September at daylight, and in 42 consecutive hours 17 siege guns discharged 1,411 shells at the work, 1,247 of which struck it, the ironclad *New Ironsides* joined in the attack, the fort was silenced, over 100 of the garrison killed and wounded, and an assault was ordered for the 7th. When morning came the fort had been abandoned and its garrison, with that of Fort Gregg, had escaped, leaving the entire island with the 25 guns of the two works in Union possession. The Union loss on Morris Island (10 July–7 September) was 381 killed, 1,372 wounded and 565 missing, an aggregate of 2,318; the Confederate loss was 157 killed, 674 wounded and 238 missing, an aggregate of 1,069. Consult 'Official Records' (Vol. XXVIII); Gillmore, 'Engineer and Artillery Operations Against Charleston, 1863'; The Century Company's 'Battles and Leaders of the Civil War' (Vol. IV).

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FORT WALLA WALLA, Wash., United States military post, established in 1857, at Walla Walla.

FORT WARREN, Mass., United States military post on Georges Island, near Boston, established in 1837. During the Civil War it was used as a military prison. It is the headquarters for the coast artillery district of Boston.

FORT WASHINGTON, Md., United States military post on the Potomac River, near Washington, D. C. It was established in 1815 as Fort Warburton. It comprises a reservation of 334 acres.

FORT WASHINGTON, N. Y., the site of a former fort at 182d street, New York city, overlooking the Hudson River. After the battles of Kip's Bay and Harlem Heights (qq.v.), Washington retreated to White Plains (q.v.) where a battle was fought 28 Oct. 1776. A council of war had decided to garrison and defend Fort Washington, it being supposed that, if compelled to evacuate, the garrison could cross the river into Jersey. Having sent part of his troops in pursuit of Washington, Howe invested Fort Washington, then defended by 3,000 men under Col. Robert Magaw. The assault occurred 16 Nov. 1776 but so intrepid was the defense that the British and Hessians lost 400 before the outworks were taken. However, when the British had come within 100 yards of the fort, Magaw could not persuade his men to face the withering fire and accordingly surrendered his remaining 2,700 troops, 2,800 muskets, 400,000 cartridges, 161 cannon and other stores. Washington then began his retreat through the Jerseys, fighting battles at Trenton and Princeton (qq.v.). Consult DeLancey, 'The Capture of Fort Washington' (in *Magazine of American History*, February 1877); Lowell, 'Hessians in the Revolution' (pp. 78–84); Gordon, 'American Revolution' (Vol. II, p. 348); Jones, 'New York in the Revolution' (Vol. I, p. 626); Stedman, 'American War' (Vol. I, p. 217); Lossing, 'Field-Book of the Revolution' (Vol. II, pp. 619–621); Force, 'American Archives' (5th series, Vol. III); Wiley and Rines, 'The United States' (Vol. II, pp. 455–459); and biographies of WASHINGTON, GREENE, KNOX, etc.

FORT WAYNE, Ind., city and county-seat of Allen County, situated in the northeastern part of the State, 102 miles northeast of Indianapolis, upon the Saint Joseph, Saint Mary's and Maumee Rivers, confluence of the first two within the city's limits forming the last named. It is notable as a railway centre, the following lines passing through or terminating there: Pittsburgh, Fort Wayne and Chicago, of the Pennsylvania Railway system; Wabash; New York, Chicago and Saint Louis; Grand Rapids and Indiana; Cincinnati, Richmond and Fort Wayne; Lake Shore and Michigan Southern; Fort Wayne, Cincinnati and Louisville; Cincinnati, Hamilton and Dayton. The city is central in a rich and highly developed agricultural region that produces abundant crops of the cereals of temperate climates. Considerable tracts of hardwood timber yet remain in what was once one of the most richly wooded sections of the Northwest. These cover a wide range and embrace numerous establishments of large magnitude including shops of the Pennsylvania and Wabash railroads. In the various industries 13,416 persons were engaged in 1914. The capital invested in 1914 in 228 establishments was $31,167,000; the cost of the materials used in the same year was $14,148,000. The salaries and wages amounted to $8,935,000 in the same period. The manufactures include car-wheels, Corliss and other steam engines, boilers, gas engines, gas machinery, iron and steel bars, freight and passenger cars, locomotives, electrical machinery and electrical fittings and fixtures, hosiery, gloves, caps, oil tanks, organs and pianos, women's garments, road construction machinery, carriages, wagons, washing machines, furniture, paper boxes, lumber, sash, doors, malt liquors, cigars, harness and leather findings and a considerable variety otherwise of products in iron and steel, wood and textile fabrics. The value of the manufactured products was $30,205,000 in 1914, an increase of 30.8 per cent over 1909. The municipality owns and operates the public waterworks system, an abundant supply of pure water being poured from wells bored deeply into the rock, and distributed by means of three thoroughly equipped pumping stations. There is a handsome and substantial city hall and police headquarters and eight modern and thoroughly equipped houses advantageously situated shelter the city fire department.

The public buildings in the city are a courthouse (county), completed in 1902 at a cost of $1,000,000; United States post office and courthouse; a public library erected at a cost of $100,000 through a donation of Mr. Andrew Carnegie; county jail; high school and manual training school building, completed in 1904 at a cost of $300,000, and 15 grammar and ward school buildings, most of which are of very modern construction and beautiful architecture. The free-school system maintained by the city embraces a high school and manual training school, a training school for teachers and 15 ward and grammar schools, together with kindergarten departments. The free-school system is governed by a board of three trustees, elected triennially by the city council, the immediate executive head of the schools being a superintendent elected by the board. There are six Roman Catholic parish schools in addition to a high school for boys and an academy for girls; and six German Lutheran parochial schools. Concordia College, founded in 1850, is seated in Fort Wayne and is maintained under auspices of the German Lutheran Church. Near the city is an academy maintained under auspices of Catholic sisters, an academy for the higher education of young women. Among other institutions of learning are a college of medicine and surgery, a conservatory of music, a school of art, two business colleges and a school of oratory, expression and physical culture. There are 47 religious congregations and 40 church edifices, many of them beautiful and costly examples of ecclesiastical architecture. The congregations are distributed denominationally as follows: Baptist, two; Christian, three; Congregational, two; Episcopal, two; Evangelical Association, one; Evangelical Lutheran (English), three; Evangelical Lutheran (German), four; German Lutheran, three; Methodist Episcopal, five; Free Methodist, one; African Methodist Episcopal, one; Presbyterian, four; United Presbyterian, one; Reformed (German), two; Roman Catholic, seven; United Brethren, one; Baptist Brethren, one; Christian Science, two. The city is the see of the Catholic diocese of Fort Wayne. The city has a central charities organization and many of the religious congregations maintain comprehensive societies for charitable and benevolent work. There are four large hospitals of modern equipment, one non-sectarian, two under Roman Catholic and one under German Lutheran administration. There are three orphan asylums, two sectarian and one maintained by the county; home for emergencies and a refuge for women. Just beyond the city limits is the State School and Home for Feeble-Minded Youth of both sexes and Home for Epileptic Women. The city has many national and private banks, trust companies and building and loan associations. Its banks represent a capitalization of about $5,000,000. The total public park acreage of the city is 95.49, distributed as follows: Swinney, 45.24; Lawton, 31.20; Reservoir, 13; McCulloch, 4; Hayden, 1.12; Piqua, .75; Old Fort (site of stockade built by General Anthony Wayne in 1794), .18. There are five cemeteries: Achduth Weshalom (Hebrew), Concordia (German Lutheran), Saint John's (German Lutheran), New Catholic (Roman Catholic), and Lindenwood (non-denominational). The city is governed under a special charter, conferred by the State legislature, which provides for a municipal legislative body of one councilman from each of the 10 wards and five at large, chosen biennially, a mayor and city clerk, chosen quadriennially, and a board of waterworks trustees, chosen biennially. The board of public works, board of public safety, health commissioner and park and street superintendents and city attorney and city comptroller are appointed by the mayor. Council fixes all municipal tax levies and appropriations and has final approval of all contracts and franchises. Fort Wayne is an important and flourishing trade centre and has a commerce that embraces extensive wholesale and jobbing operations in dry goods, groceries, light and heavy hardware, drugs, millinery, paper, etc. The total volume of wholesale trade has a value of about $10,000,000. The total post office receipts are about $200,000 annually. The city takes its name from a fort built on a part of the present site of the city by Gen. Anthony Wayne in 1794. The place, however, had a history that long antedated this. There is evidence that LaSalle had visited the locality as early as 1670. It was the site of Ke-ki-on-ga, the «central city» of the once powerful and warlike Miami Indians. At different times during the 17th and 18th centuries French and English had military posts at Ke-ki-on-ga. In 1790 General Harmar led an expedition against the Miami city, but was signally defeated in a fierce engagement on the Maumee River within what is now the limits of the city of Fort Wayne. In 1791 General St. Clair in a similar expedition was overwhelmed a short distance southeast of Fort Wayne by the Indians under the famous Miami chief, Little Turtle. General Wayne in 1794 headed a third expedition against the Indians in the Northwest and after utterly defeating them at the battle of Fallen Timbers on the Lower Maumee in northwestern Ohio marched to Ke-ki-on-ga and in September of that year built his stockade on an eminence overlooking the confluence of the Saint Joseph and Saint Mary's rivers. There was no further serious trouble with the Indians until August 1812, when the conspiracy of Tecumseh and his brother The Prophet ensued in a close investment of Fort Wayne and its meagre garrison. The siege was vigorously pressed for about two weeks, when it was raised by a force that had been dispatched to relief of the beleaguered garrison. Fort Wayne at once assumed importance as a trading post and in 1825 the town itself was laid out. In 1840 Fort Wayne took rank as a city. Between 1850 and 1860 began the era of railroads, when growth received fresh and powerful impetus and Fort Wayne came to be one of the foremost industrial and commercial cities of the State. Pop. (1910) 63,933; (1914) 72,332. Consult Dillon, J. B., 'History of Indiana' (Indianapolis 1859); Smith, 'History of Indiana' (2 vols., Indianapolis 1893); and Levering, 'Historic Indiana' (New York 1909).

CHARLES L. BIEDERWOLF,
Secretary of The Commercial Club of Fort Wayne.

FORT WILLIAM, Canada, city in the district of Thunder Bay, Ontario, at the head of lake navigation on Lake Superior. It is on the Canadian Pacific, Canadian Northern, Grand Trunk Pacific and Mount McKay and Kakabeka Falls railways. Ogilvie's flour mills, with a capacity of 15,000 barrels daily, are located here and the city has important hardware and stove manufactures, foundries, brickyards, shipbuilding and car works, sash and door factories, starch works, etc. Value of manufactured products $534,097 in 1910 and rapidly growing. Traffic, both by railways and the lake steamers, is active; there is good water power and the harbor is excellent. Noteworthy public buildings are the city hall, public library, two hospitals, courthouse, collegiate institute, etc. Grain elevators numbered 17 in 1914, with a capacity of 27,401,000 bushels. Lumbering is an important industry. Tramway (26 miles), telephone and electric light services and waterworks are owned by the city. Founded by fur traders in the early years of the last century, Fort William became a town in 1887 and a city in 1907. The government is vested in a mayor and a council of eight members, elected annually. The population numbered 16,499 in 1911, showing an increase of nearly 13,000 in a decade.

FORT WILLIAM HENRY, a fort erected in 1755 at the head of Lake George, on the site of the present town of Caldwell, N. Y. It was a starting point for expeditions against the French during the French and Indian War. In 1757 it was attacked by Rigaud and later in the same year the English garrison surrendered to Montcalm who permitted it to march to Fort Edward escorted by some French regulars. On the march the party was set upon by hostile Indians and many were slain and about 200 carried into captivity. Consult Parkman, 'Montcalm and Wolf' (3 vols., Boston 1906); and Sloane, W. M., 'The French War and the Revolution' (New York 1901).

FORT WORTH, Tex., city and county-seat of Tarrant County, 175 miles northeast of Austin, on the Trinity River, and Texas and Pacific, Santa Fe, Frisco, Trinity and Brazos Valley, Rock Island, Cotton Belt, Houston and Texas Central, Fort Worth and Denver City, International and Great Northern, Missouri, Oklahoma and Gulf and Missouri, Kansas and Texas railroads. Fort Worth is an important railroad centre and handles more than five times the number of freight cars yearly than any other city of North Texas. During 1915, 1,136,201 freight cars were inspected through the local yards and a large proportion of these stopped to receive and discharge freight. At the present time there are approximately 4,000 railroad men who receive their pay in Fort Worth. With an average of four to a family this would give about 16,000 people dependent on the railroads for support. Its importance as a railroad centre has been recognized by 11 large grain companies who have built elevators there, having a daily capacity of 1,198,000 bushels, and a storage capacity of bulk grain of 2,120,000 bushels. There are also eight warehouses with a capacity of 275,000 sacks. Seventy-five per cent of the traffic of Texas passes through Fort Worth, and each day 174 package cars leave the city to supply quick and efficient service to the out of town merchants.

Fort Worth is also an important banking centre and seems likely to become the greatest west of the Mississippi and south of Kansas City for the reason that it is located in the heart of a great farming and stock raising country. It is the live-stock market for the Southwest. Stockmen realize $250,000 in Fort Worth daily. It is also a fruit and produce centre, and has the asset of good roads and Tarrant County is building more. These roads connect with avenues of traffic leading into surrounding counties. It received more than $5,000,000 for horses and mules sold in the live-stock market to the warring nations in the first six months of 1916. Its building permits have increased substantially in the same period. An extensive trade is carried on in hogs, sheep and cattle, cotton oil, grain, fruit and produce. The industrial establishments include stockyards whose daily capacity is about 27,500 head, large packing-houses, grain elevators, flour, cornmeal and stock-feed mills, breweries, rolling mills, railroad repair shops, foundries and machine shops, cotton and oil mills, tin silo plants and manufactories of clothing, furniture, chemicals, candy, wagons and carriages, etc. The United States census of manufactures for 1914 showed within the city limits 180 industrial establishments of factory grade, employing 3,044 persons: 2,308 being wage-earners, receiving annually a total of $1,542,000 in wages. The capital invested aggregated $8,595,000, and the year's output was valued at $9,974,000; of this $4,142,000 was the value added by manufacture. The deposits for the largest banks and financial institutions as shown by the last report, compared with those of 1914, are in total as follows: 1914, $16,142,998; 1915, $25,395,000. The business transacted through the clearing-house averages about $1,250,000 a day. The annual bank clearings of Fort Worth clearly indicate the high volume of the manufacturing and jobbing business conducted in this city. In 1915 the bank clearings totaled $435,289,425.17.

The schools and colleges of Fort Worth are among the best in the Southwest. One university, two colleges, nine private and preparatory schools and four business colleges augment the public school system. Aside from 18 buildings used for public school students, Fort Worth has two high schools for whites and one for negroes. The scholastic census for 1915 was almost 14,000. In the denominational institutions are represented Christian, Methodist, Baptist, Catholic and Episcopal. These schools have been progressive in recent years and their attendance is increasing. It contains a Carnegie library, Court of Civil Appeals Law library and the Medical College medical library. Fort Worth has 31 parks consisting of 433 acres, 216 miles of paved streets, and Tarrant County has 650 miles of improved roads. Fort Worth has a large and modern electric power plant with a capital of $3,680,000 supplying current to neighboring towns and cities to the extent of 100 miles, and owns a large reservoir with a capacity of 30,000,000,000 gallons, covering an area of 6,000 acres, offering cheap water for all purposes. Founded as a military post by Maj. R. D. Arnold in 1849, Fort Worth became the county-seat in 1860 and was first incorporated in 1873. The commission form of government was adopted in 1907. Pop. (1880) 6,663; (1910) 73,312; (1916) 100,000.

G. G. Gumm,
Secretary, Chamber of Commerce.

FORT YELLOWSTONE, a Federal military station, established as Camp Sheridan in 1874, located on a 28-acre reservation, on Beaver Creek, in the Yellowstone National Park. It is reached by the lines of the Northern Pacific Railroad, and is about five miles distant from Gardiner. Mammoth Hot Springs is the nearest telegraph station. The duty of the garrison is to enforce the regulations of the government in regard to camping, wood-cutting, etc., in the park and to protect travelers.

FORT YUKON, an old trading-post situated at the great bend of the Yukon River and within the Arctic Circle. A native school here is in receipt of government aid.

FORTALEZA, or **CEARA,** Brazil, city, port and capital of the state of Ceará, seven miles from the mouth of the Ceará River on an open plain overlooking the sea. It is regularly laid out, and has broad, well-paved streets and numerous squares. It is connected by rail with fertile inland regions. The temperature is modified by strong sea winds. It contains a government house, legislative chambers, bishop's palace, a lyceum, hospital and asylums. The port is the principal outlet for the products of the state, but the harbor is an open roadstead. Improvements are under way to make it safer for sea-going vessels. Sugar, coffee, rubber, cotton, rum, rice, beans, hides and skins are the principal exports. Fortaleza originated in a small village which grew up around a fort established here in colonial times. In 1654 it became known as Villa do Forte da Assumpção. In 1810 it was made the capital of Ceará and in 1823 received its charter as a city. Pop. 45,000.

FORTE (Ital. loud), in music, the term for loud usually designated on the scores by *f*. *Fortissimo*, very loud, is designated by *ff*.

FORTESCUE, Sir **John,** English jurist: b. Norris, Somersetshire, about 1394; d. about 1476. He was educated at Exeter College, Oxford. In 1441 he was made king's sergeant at law and in the following year chief justice of the King's Bench. He was a favorite with Henry VI, to whom he remained most loyal and whom he served most efficiently. He was attainted of treason in the first Parliament of Edward IV. In 1463 he accompanied Queen Margaret into exile and afterward returned with her to England. While on the Continent he wrote for young Prince Edward the celebrated work 'De Laudibus legum Angliæ.' He made his submission to Edward IV, and from him received a general pardon. In 1714 was published Fortescue's 'The Difference between an Absolute and a Limited Monarchy.' In a revised version it appeared in 1885 under the title of 'The Governance of England.' Consult Foss, 'Lives of the Judges' (1870).

FORTESCUE, Sir **John,** English statesman: b. about 1531; d. 23 Dec. 1607. He was a distant relative of Queen Elizabeth; his father was executed in 1539, but the son was restored to his title and estate in 1551. During the reign of Mary he was instructor to the Princess Elizabeth, on whose accession he was appointed keeper of the great wardrobe. In 1572 he entered Parliament and in 1589 was made Chancellor of the Exchequer, in 1592 he was knighted and in 1601 was made chancellor of the Duchy of Lancaster. James I deprived him of the chancellorship of the exchequer, but he remained in favor with the king. He was a candidate for Buckinghamshire in 1604, in an election declared void by the Lord Chancellor on the ground of a sentence of outlawry under which Fortescue's opponent lay. He served with unswerving honesty and fidelity and was also noted as a scholar.

FORTH, fōrth, a river of Scotland, rising on the east side of Ben Lomond, in Sterlingshire.

FORTH BRIDGE. See Bridge.

FORTIER, Alcée, American educator and author: b. Saint James Parish, La., 5 June 1856; d. 1914. He received his education at the University of Virginia and at Paris. He held the posts successively of teacher in the high school, New Orleans, and principal of the preparatory department of the University of Louisiana. In 1883 he became professor of French at the University of Louisiana, was re-elected to this post when the university became Tulane University. In 1894 he was made professor of Romance languages and in 1913 was made dean of the graduate department. For many years he was a member of the Louisiana State Board of Education and was president of the Catholic

Winter School of America in 1897–1902. He also served terms as president of the American Folklore Society, the Modern Language Association and the Alliance Française, and was a chevalier of the Legion of Honor. He published 'Gabriel d'Ennerich' (1886); 'Bits of Louisiana Folk-Lore' (1888); 'Sept grands auteurs du XIXe siècle' (1889); 'Histoire de la littérature française' (1893); 'Louisiana Studies' (1894); 'Louisiana Folk-Tales' (1894); 'Voyage en Europe' (1895); 'Précis de l'histoire de France' (1899); 'History of Louisiana' (4 vols., 1904); 'History of Mexico' (1907); 'Cyclopedia of Louisiana History' (1909). He edited various French texts and was a contributor to the 'Catholic Encyclopedia.'

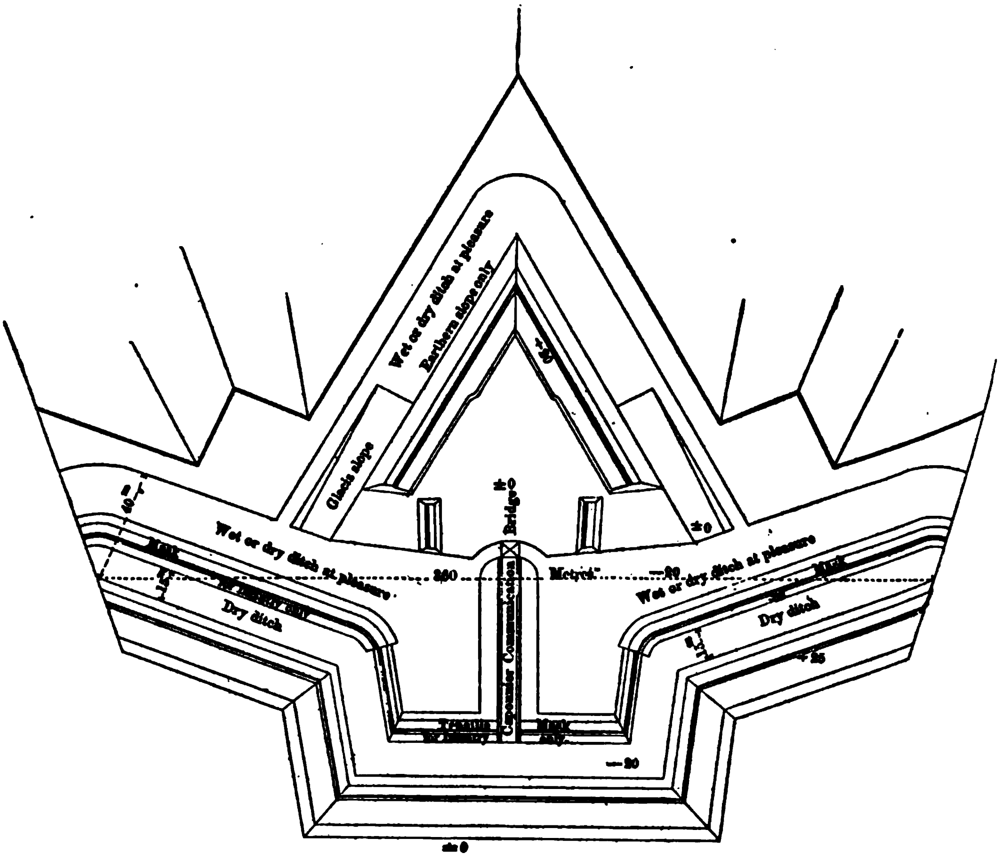
FORTIFICATIONS. From the remotest civilization the art of fortification, in some guise or another, has been in practice by all nations and its character has been more or less influenced not only by the natural features of the country, but by the political and social conditions of its inhabitants. In its earliest applications, we find men resorting to one or more simple enclosures of earthen walls; or of these surmounted by stakes placed in juxtaposition; or of stakes alone firmly planted in the ground, with a strong wattling between them. A resort of such feeble means shows not only a very low state of this branch of the military art, but also of that of the attack. This class of fortifications for the defense of entire frontiers was mostly employed in the east of Europe and was at the time found to be a sufficient protection against those nomadic tribes that for ages roamed over its vast plains. The next obvious and necessary step was to form walls either of rough blocks of stone, or of these interlaced with the trunks of heavy trees. Obstructions of this kind could be used only to a limited extent, and were confined to the defenses of places forming the early centres of population. As human invention was developed, these, in turn, were found to present no serious obstacle to an assault by escalade; giving to the assailed only temporary advantage of a more commanding position, and they gave place to walls of dressed stone or brick, whose height and perpendicular face alike bade defiance to individual attempts to climb them, or the combined effort of an escalade. These formidable defenses, with flanking towers, were in their time found to be insufficient against the ingenuity and skill of the assailant, who, by means of covered galleries of timber, sometimes above ground and sometimes beneath, gradually won his way to the foot of the wall, where, by breaking his way through it, he removed the sole obstruction to a bodily collision with the assailed. Changes in the attack led to new modifications in the defense, which consisted in surrounding the place by wide and deep ditches, of which the walls formed the scarp, the counterscarp being either of earth or revetted. The gigantic profile often given to the fortifications of antiquity seems almost incredible, as well as their extent. In many cases a double wall of stone or brick was filled in between with earth, forming a wide rampart upon which several vehicles could go abreast. The wall built by the Romans between Carlisle and Newcastle to restrain the incursions of the Picts into the southern portions of the island was 16 miles in extent, about 12 feet in height, and 9 feet in thickness. The dimensions and extent of this work sink almost into insignificance when compared with those of the celebrated wall of China, built to restrain the incursions of the Tartars. This structure was about 1,500 English miles in length, having a height of 27 feet and a thickness at top of 14 feet. The mode of attack of fortified places resorted to by the ancients was reduced to settled rules, and brought to the highest state of perfection by the Greeks, about the time of Alexander the Great and the immediate successors to his conquests. An essential feature in it, whether in the sieges of inland fortresses or those on the seaboard, was to cut off all communication between the place and the exterior by hemming it in by sea and land with stationary forces, covering themselves by lines of entrenchments strengthened by towers, and, in the case of seacoast places, also by fleets, from assaults both from without and from the place invested. The Romans evinced their decided military aptitude not only in the employment of the ordinary systematic methods of the attack and defense of fortified places, but in their application of the cardinal principle of mutual defensive relations between the parts of a fortified position, obtained by advanced and retired portions of the enceinte, and also in the adaptation of entrenchments to the natural features of the site.

With the invention of gunpowder and its application to military purposes, a gradual revolution took place in the general forms and details of fortification. Naked walls alone did not offer either suitable conveniences for the new military machines, or sufficient protection against the projectiles thrown from them. This led to the introduction of earthen ramparts and parapets which were placed against the walls and suitably arranged to meet the exigencies of the moment. The art received something like a scientific basis about this time in Italy, from which the names and forms of most of the elements of fortification now in use are derived. It was at this epoch that the bastioned form of fortification first appeared.

Bastioned System.— The improvements made in siege-artillery toward the end of the 16th century caused Sully, the Prime Minister of France, Grand-master of Artillery and Superintendent of Fortifications, to take measures to modify and strengthen the fortifications then existing in France. The noted military engineers, Errard, of Bar-le-Duc, De Ville and Count de Pagan, were successively charged with these modifications and left their impress upon the works entrusted to them. They were followed by Vauban, and he by Cormontaigne. Although modifications have been made in the bastioned system since the time of Cormontaigne, its essential basis is that of his method. A knowledge of the bastioned system would not be complete without an acquaintance with his method and those of Vauban.

A bastioned enceinte consists of a series of bastions, which occupy the salient angles of the polygon within which the enceinte is enclosed; the flanks of the bastions being usually connected by straight curtains. The sides of the polygon which connect the salient angles of the bastions are termed the exterior sides, in contradistinction to the sides of an interior polygon which, being parallel to the first and occupying the positions of the curtains, are termed the interior sides. The polygon may be regular or irregular. The bastioned enceinte, when its relief and plan are suitably arranged, possesses the advantage of having its ditches thoroughly swept from within the enceinte itself, thus securing the flanking arrangement of the scarp; of bringing a cross and flank fire to bear upon the approaches on the salients of the enceinte; and furnishing a strong direct and cross fire upon the site in advance of the curtains and the faces of the bastions.

The position of the flank will vary between the limits, a perpendicular to the curtain, and a perpendicular to the opposite face let fall from the point where the curtain intersects the line of defense. A position intermediate to these has been generally adopted; in most cases, placing the flank so as to make an angle of about 100 degrees with the curtain. The length should be sufficient to allow it to be armed with at least two pieces of artillery; this will determine the least length of flank. It may be increased beyond this, to any extent demanded by the circumstances of the defense. From the effect had in so doing to increase the length of curtain and to diminish the interior space in the bastion, the maximum length has been restricted to 50 yards.



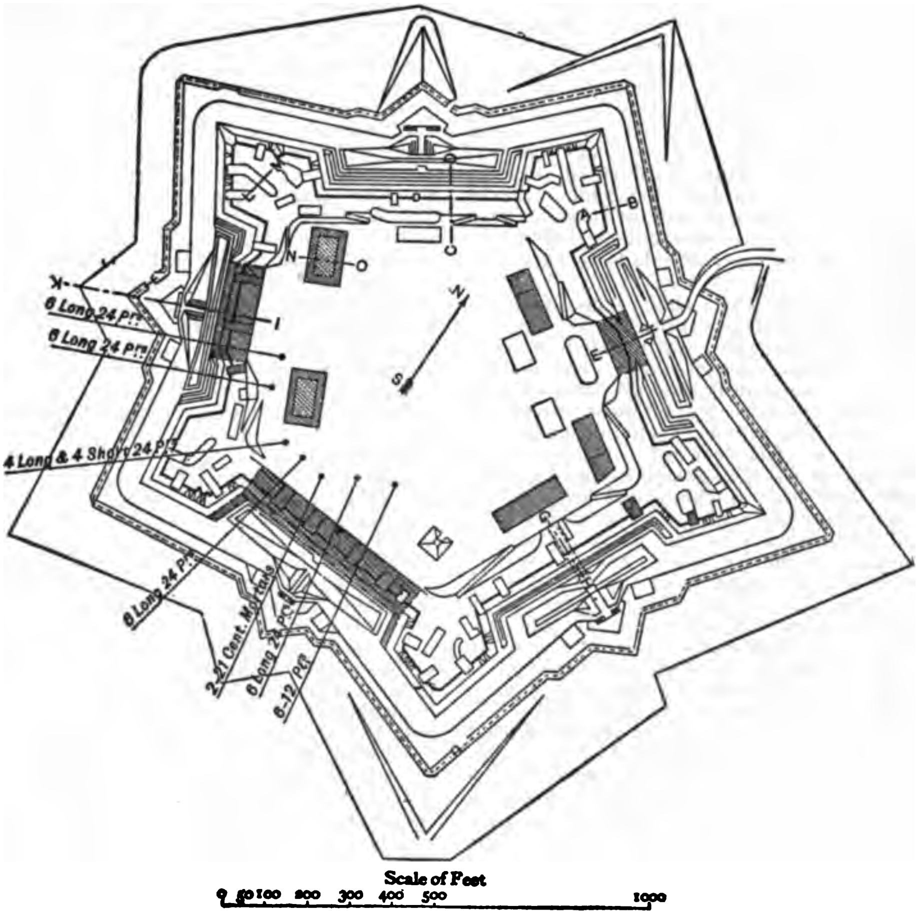
French System of Fortification. The ordinary Front with located Masks, Ditches, Slopes and Communications.

The face of the bastion is usually directed on the curtain-angle. In this case the entire fire of the flank can be brought to bear on the enceinte-ditch along the foot of the scarp-wall of the face. Circumstances may require a different position: directing it on some point on the curtain, or on some point on the flank. With the advantages gained there will be corresponding disadvantages. Their relative values will decide it. The relative positions of the curtain, flanks and lines of defense, and their respective lengths affect the length of the faces. If the line of defense is equal only to the distance between the curtain-angle and opposite shoulder-angle, the corresponding length of face will be zero; if the curtain and the flanks have their least and the line of defense its greatest length, the resulting face will be the longest that we can have.

Bastioned Fort.— The bastioned fort has been devised to remedy defective flanked dispositions. It may consist of a polygon of any number of sides, but for field-forts the square and pentagon are generally preferred. To plan a work of this kind, a square or pentagon is first laid out, and the sides bisected by perpendiculars, HI; a distance, GH, of one-eighth of a side in a square (one-seventh in a pentagon) is set off on the perpendiculars; from the angular points of the polygon, lines DA, CF are drawn through the points thus set off; these lines give the direction of the lines of defense; from the salients of the polygon, distances equal to two-sevenths of a side are set off on the directions of the lines of defense, which give the faces; from the extremities of the faces the flanks are drawn perpendicular to, or making an angle of 100 degrees with, the lines of defense; the extremities of the flanks are connected by curtains, CD.

In deciding on the general plan to be carried out, the following considerations require attention: the object the work is expected to fulfill, and its situation with respect to the enemy; whether it is likely to be attacked by overwhelming forces; whether artillery is likely to be brought against it, or infantry, and whether it can be surrounded; the number of men there will be for its defense, observing that it is better to have a force concentrated, and that it is therefore injudicious to make works of a greater extent than can be well manned and vigorously defended. Another consideration that must not be omitted is the number of men that can be collected for working, whether there are tools enough and time enough to do it.

An examination of the arrangement of a bastioned front will show that there are neither dead-angles nor sectors without fire; that the salients, and all the ground within the range of fire, are protected by formidable columns of direct, flank and cross-fire. There is one point in this system that demands particular attention, which is, that the counterscarp of the ditch, if laid out parallel to the interior crest, would form a dead-angle along each face near the shoulder; because the fire of the flank would be intercepted by the crest of the counterscarp. To prevent this, either the counterscarps of the faces must be prolonged to intersect, and all earth between them and the scarp of the flanks and curtain be excavated, or the ditch of each face must be inclined up in a slope from the bottom, opposite the shoulder, so that it can be swept by the fire of the flank. The first method is the best, but requires most labor; the second is chiefly objec-



Plan of Fort Issy — Defenses of Paris (1870).

tionable as it gives an easy access to the ditch, which might be taken advantage of in an assault.

Forts have been proposed with half-bastions, but being very little superior to the redoubt and much more difficult of construction, they ought never to be used. The exterior sides of the bastioned fort should not exceed 250 yards, nor be less than 125 yards, otherwise the flanking arrangements, with the smooth-bore musket in the former case, and the flanks too short in the latter, will be imperfect. With a relief of 24 feet, which is the greatest that, in most cases, can be given to field-works, and an exterior side of 250 yards, the ditch of the curtain will be perfectly swept by the fire of the flanks, the lines of defense will be nearly 180 yards, a length which admits of a good defense, and the flanks will be nearly 30 yards. With a relief of 14 feet, the least that will present a tolerable obstacle to an assault, and an exterior side of 125 yards, the ditch of the curtain will be well flanked, the flanks will be nearly 20 yards in length, and the faces between 30 and 40 yards. Between these limits, the dimensions of the exterior side must vary with the relief.

Dutch School.— The Dutch school takes its rise in the political necessities of the times in which the national spirit was aroused to throw off an onerous foreign yoke. The aquatic character of the country, and the want of time and pecuniary means, led to those expedients of defense which are never wanting under like circumstances. The deficiency of earth led to the formation of low parapets for the main enceinte and wide ditches filled with water. The main enceinte was usually preceded by a second one with a very low parapet to sweep the surface of the wet ditch; and this second enceinte was separated from the first day by a dry ditch, which favored sorties, and which was provided with all the means, as palisades, tambours and block-houses, for offensive returns and surprises. The second enceinte was generally covered from an exterior command by a glacis in advance of the main ditch. The covered-way between the glacis and the ditches was, to a great extent, deprived of its essential offensive feature by an exterior wet ditch made at the foot of the glacis and inclosing it, over which communication with the exterior was kept open by temporary bridges. The whole of the defensive measures of this school seem to have had solely for their object a strictly passive resistance. With this view, long lines of entrenchments, supported from distance to distance by forts, connected their frontier towns and villages, affording a sufficient obstacle to marauding expeditions, and requiring the efforts of a strong force to break through them.

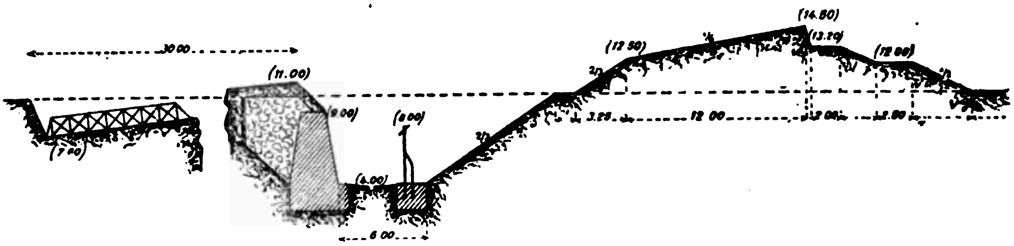
French School.— What may be termed the characteristics of the French school are to be seen rather in the method of Cormontaigne than in the practice of Vauban, although his authority has exercised a preponderating influence throughout Europe, and is appealed to in all great problems of the art. This school is characterized by the retention of the profile of the Italian school, combined with the outworks of the Dutch, and a systematic arrangement of all the parts. The French have evinced in this, as in all the other arts, that spirit of systematic combination which forms one of their most striking national traits.

It has been observed how the natural features of the country, like Holland, and the national characteristics of the people, like the Spanish, have modified the plan and profile of their works. This is particularly true in Sweden and partly so in Germany. The part played by Sweden upon the theatre of Europe, under Gustavus Adolphus and Charles XII, served to develop in this nation every branch of the military art, and produced a number of distinguished generals and engineers, Virgin holding the first place. In this school the bastioned system seems to have been generally adopted for the enceinte, great attention being paid to covering the faces of the works from enfilading fire; in providing casemates having reverse views on the besiegers' works; and particularly in so arranging the interior dispositions that each part should not only contribute to the defense of the others, but be capable of an independent resistance. These dispositions necessarily led to great complication and multiplicity of works.

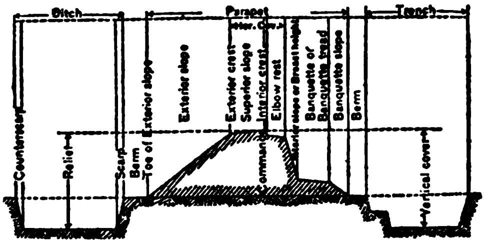
The introduction of cannon, although it led to important changes in the measures both of the attack and defense, still did not, for a considerable period, bring about any very decisive results in the length of sieges. The means which it afforded the defense of reaching the besiegers at a distance, and of destroying all the methods of approaching and annoying the place which had hitherto been used, led to the substitution of the ordinary trenches for the wooden galleries and other similar expedients for approaching under cover, and to the erection of batteries at distant points to open breaches in the walls. Lines of circumvallation and countervallation, which formed so prominent a feature previously to this epoch, was the only one which still kept its place to a greater or less extent to the present day. For the purpose of effecting an entrance into the place, breaching-batteries were erected opposite the points deemed most favorable. The approaches were made by zigzags along the capitals of the salients to the counterscarp, where a covered descent was made into the ditch opposite the breach preparatory to its assault. When the wall was not exposed to a distant fire, the besiegers were obliged to carry the covered-way by assault, and established their breaching-batteries on the crest of the glacis.

But little deviation was made in the above described methods until Vauban appeared upon the scene. Before him, Montluc, a distinguished French general and engineer, had introduced short branches of trenches, which were run out from the angles of the zigzags, to post a few troops for the immediate protection of the workman; but these were found to be very insufficient in repelling sorties of any strength. The event which seems to have had the greatest influence on the subsequent progress of both the attack and defense was the memorable siege of Canada, in which volunteers from all parts of Europe engaged, and who, after its close, disseminated throughout their respective countries the results of the experience they had there acquired.

Field Fortifications.— The art of fortification includes, generally speaking, two branches — *strategical* or deliberate and *tactical* or hasty fortification. The first includes defensive works, executed largely in time of peace for the protection of harbors, cities, arsenals, etc., while tactical fortifications are those executed to meet the immediate tactical needs of the mobile army in the field, and are generally known as field fortifications, the immediate purpose of which is to increase the power of resistance of the troops occupying them by decreasing their exposure to the fire of the enemy and increasing the accuracy and volume of their own fire. Generally speaking, field fortifications increase the fire effect of the troops. The great strength of field fortifications to-day comes largely from their low visibility as targets, whereby they force the attack to obtain with volume the effect formerly obtained with accuracy of fire. To compensate for scarcity of men the Germans make use of a great number of automatic and machine guns. It is estimated that on the French front they had one machine gun to every 10 or 12 metres of front. It is evident that a line thus strongly held cannot be captured unless use is made of mobile protection, for the attacking personnel or the hostile trenches are overwhelmed with high explosives, liquid fire and asphyxiating gases. The offensive is still the achieved victory, in spite of the changes in methods. The solution of the problem must be sought in the development of mechanical means to supplement the moral and material forces of the offensive.



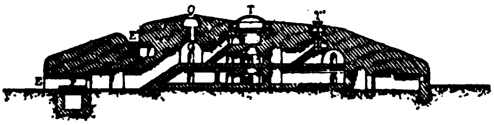
Profile of a French Permanent Fortification (1909).



Profile of Field Fortification.

The fortresses guarding Warsaw and the Russian frontier were quickly taken in the Teutonic advance of 1915, either by manœuvring the defenders out of their fortifications, or, as at Novo Georgievsk, by shattering them with the heavy siege guns. The fortress of Ossowetz on the Niemen-Bobr-Narew line had a different history. Ossowetz stands on the east bank of the Bobr River, along a ridge covered with woods, affording good artillery positions which commanded the opposite bank, where positions were poor. There were extensive marshes along the river which in winter were frozen over. The Germans first tried to turn the positions, but failing in this, brought up their heavy siege guns. The Russian batteries were, however, so well concealed that they suffered very little damage and succeeded in silencing several German batteries. As the warm weather advanced, the marshes made it difficult for the Germans to emplace their guns. Ossowetz, although first attacked in February 1915, did not fall until 22 Aug. 1915, in the general retreat after the fall of Warsaw.

The failure of the forts is due to several causes: (1) Their location and details of construction were known some years before the war, and guns were especially designed to destroy them. (2) Their armament was not up to date and, therefore, easily overpowered by the latest types of guns, the existence of which was unknown to the defense. (3) The garrisons permitted the enemy to emplace his guns within effective range, but beyond the range of the guns of the defense. (4) The advantage of concealment as a defensive measure is illustrated by the operations against Ossowetz. (5) The advantage of keeping the enemy at a distance is illustrated by the operations around Verdun and Nancy.

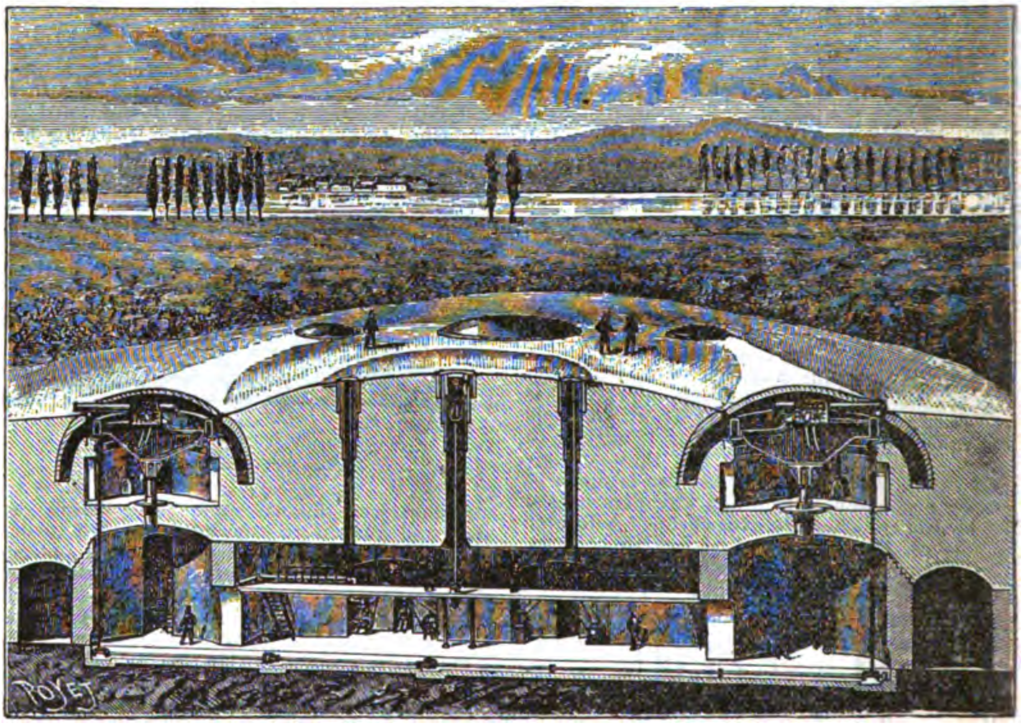


Cross-section of a Fort.

The experiences of the European War confirm the conclusion reached during the siege of Port Arthur in 1904, that the mounting of large-calibre guns in a fort for use against siege guns of the enemy is a fatal error.

A modern fortress should consist of a large area, so organized as to ensure extreme mobility to troops and guns. Concealment is all important. Permanent gun emplacements should therefore be constructed only at important points with the primary intention of delaying the enemy in bringing up his heaviest siege guns. The main reliance should be placed upon mobile guns, some of which should be at least as powerful as any which the enemy can bring up. These mobile guns should be located in earthen emplacements, well concealed from hostile observation. Unless the garrison is strong enough in both mobile troops and mobile guns to prevent the enemy from coming within effective range of his objective, then there is no hope of offering a prolonged resistance. Consequently, entrenched areas with mobile troops and mobile guns are a more dependable protection than a stereotyped system of permanent forts.

Permanent Fortifications.— The tendency to dissemination in permanent fortifications began in 1885, after experiments by Van Sauer and Mangin, who demonstrated the effect of high explosive shells and advocated very small armored forts. From these experiments and those of other French officers arose the system of small, isolated forts, heavily armored and united by a belt line railroad, on which ran trucks carrying heavy guns. Later this system was adopted by the Germans at Metz.



Cross-section of the Mougin Subterranean Concrete Fort (1887), with Armaments of Four 15-cm. Guns and 8 Machine Guns.

Colonel Voelki bases his calculations on a firm belief that it is not necessary greatly to increase defensive means; contending that analogous conditions obtain for the attack and defense; and that small forts with movable heavy artillery form a correct defense. This principle relies upon the small size of targets and the consequent difficulty of hitting and destroying them; and thus discards the idea of utilizing heavy centres of passive resistance except when absolutely unavoidable.

A typical work should fulfil the following conditions: (1) Efficacious fire against the attack until the last moment. (2) Support to neighboring works with defiladed guns under cover to sweep the intervals. (3) Protection against assault. (4) Disposition such that, if the enemy occupies part of the line, he cannot maintain himself against counter attack.

These conditions are obtained by successive lines and a development of the front to the maximum permitted by the terrain. There should be a first line of continuous trench *en barbette,* supported by small armored forts — all in front of the main lines, consisting of small works for rapid fire and heavy guns under cover of a heavy mass of concrete, in rear of which another defiladed line of the same character covers the intervals and supports the works in front. The gorge is closed and the entrance is through a subterranean passage.

Forbenius believes that the fortified places that have been captured during the European war may be placed in three groups — those that capitulated after a brief bombardment, those that were evacuated without resistance and those that surrendered after a siege of 7 to 12 days. The first were taken by storm on account principally of the superiority of the attacking artillery, which occupied good positions and fired effectively on visible and well-defined targets without interference. The second group, although abandoned without resisting, would have suffered the same fate had they held out; while the third suffered from lack of offensive initiative on the part of the garrisons, though also in these cases the artillery preponderance greatly favored the Germans. Others, such as Toul, Verdun and Belfort, have survived because the mobile armies have co-operated in their defense by taking advantage of all the accidents of the terrain to construct advanced lines, such as above outlined. Still others, such as Paris, Przemysl, Cracow and Koenigsberg, have assisted the field armies with their garrisons.

From these cases it may be deduced that the enemy must be held at a distance, and that a large target must not be presented to him. The first is obtained by providing the forts with high power heavy guns for grazing fire to oppose vigorously the large calibre guns employing high angle fire, the only class that up-to-date has sufficient mobility for siege trains. And to avoid the destruction of the works the thickness of armor and concrete cannot be much further increased, but the field fortification system must be used; that is, the elements must be disseminated and a close co-operation with the field army must be maintained, while the latter, resting on the works, must not interfere in the zone of action of the garrison.

Colonel Marrullier of the Italian engineers presents two propositions: one purely technical and the other tactical. He would have (a) a line of auxiliary defenses, held by infantry and small calibre artillery; (b) a line of isolated turrets, separated by 30 or 40 metres; (c) a line of protected storehouses, to supply these turrets, 50 metres to the rear; (d) a line of shelters for personnel and material, 150 to 200 metres from the turrets; (e) a network of communicating trenches for every purpose in rear and between the lines. This general plan conforms to what appears to be necessary for future fortification.

Other writers agree in general with these ideas. All insist on an intimate co-operation between garrisons of fortified places and the field armies, so as to prepare for the latter an advantageous field of battle. On the defensive the problem is to secure protection against the transportable heavy artillery of the assailant. The idea that permanent fortification is a thing of the past is fallacious. On the contrary, the correct tactical employment of troops still requires the support of fortified places; and a proper use of these points of support embarrasses the enemy and increases the power of one's own troops.

The fortress of Ossowiez is a classical example that a modern extensive field fortification, which offers no concentrated targets to the enemy, can absolutely neutralize the power and effect of the latest siege mortars and howitzers. The hopes placed in the strongest fortified place in the world, Antwerp, were blasted by the wonderful progress made in the science of ordnance construction. The greatest ordnance triumph was the Austrian 42-centimeter howitzer, firing an 850-kilogram projectile, maximum range 15 kilometers. It was employed for the first time in the forcing of the Dunajec.

Most modern armored turrets for inland barrier forts are made of armor from 25 to 35 centimeters in thickness. The surrounding concrete is from 2 to 2.5 meters in thickness. Nevertheless this mass was absolutely demolished by the large calibre mortars used by the Germans and Austrians. Considering the terrible effect of these modern heavy mortars, we must concede their overwhelming superiority over the most modern armored forts. They reduced Fort Loncin to a confused mass of twisted steel and broken concrete. Fort Manonvillers, the most powerful individual work in the world, was reduced to ruins. At Loncin an armored cupola 250 millimeters in thickness was completely perforated. At Longwy a shell pierced not only the armored cover but also went through three floors of the casemates.

Coast Fortifications.— The defense of coast line involves the use of both naval and land forces and the objects for which coast fortifications are established are as follows: (1) For the protection of important harbors and the shipping lying therein; (2) to prevent the bombardment of the largest coast cities; (3) to afford safe refuge to the fleet when confronted by a superior enemy; (4) to protect the naval bases established in distant seas along the routes of trade. The limitations of coast fortifications are great and perhaps the most vulnerable element in most cases is the fire-control system, the stations of which are not adequately concealed nor properly covered. Since accuracy of plotting requires that observing points be fixed, mobility is not applicable to these stations.

The service of security and information in coast defense, as in the field, implies collection of military information, its transmission and its correlation and use. In the future coast patrol will undoubtedly become one of the strongest arms of the service of security and information and this patrol or guard must, when organized, be thoroughly efficient in numbers, personnel and equipment. Its men must be well-disciplined soldiers, intelligent and keen, skilled as observers and trained in the use of the telegraph and all mechanical appliances. In addition to fire-control systems there must exist both within and without artillery districts the factor of coast defense, that includes lines of information, whether electrical or visual, by means of which artillery headquarters are kept in touch with the interior of the country and with centres of control, the factors and elements of the defense brought into co-ordination, fixed positions connected and the district bound into a whole under the control of one commánder. In general, artillery lines of fire-control and of information are, in times of peace, permanent in type; but in war to permanent lines are added a network of temporary systems both flexible and extensive, in character resembling those of an army in campaign. The temporary lines of artillery districts must include many aerial systems, and even the permanent communications cannot be electrical alone.

The war of to-day is one of position, the front of which resembles a vast factory containing every class of machine, each machine and its operator having a definite task to perform. The front is formed of numerous lines of continuous trenches, redoubts, fortified towns and woods placed in state of defense, all connected with lines of communication; the whole forming an enormous system of earthworks, which may extend in a direction perpendicular to the front, for a great distance. This complex system of trenches is divided into three zones, the organization of which varies with their mission as zones of combat, defense works or of rest.

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Edward S. Farrow,
Consulting Military and Civil Engineer.

FORTIFICATIONS, Modern Seacoast. See Fortifications.

FORTIGUERRA, fôr-tē-gwā'rä, **Niccolo,** Italian poet and prelate: b. Pistoia, 7 Nov. 1674; d. Rome, 17 Feb. 1735. A prelate at the court of Pope Clement XI. In his epic poem 'Ricciardetto,' so-called from one of the Paladins of Charlemagne, he wished to show that it was easy to imitate Ariosto. He wrote the first canto of this poem in one night, and continued it to 30 cantos. It appeared (1738) under the name of Carteromaco, which had been assumed by the author during his life. Its principal excellence consists in the description of situations. His short poems and sonnets are to be found in different collections of Italian poets.

FORTIS, Alessandro, Italian statesman: b. Forli, 1841; d. 1909. He studied at the University of Pisa, later joined Garibaldi, with whom he fought at Mentana. In 1874 his radical views brought about his arrest during the elections of that year. Six years later he was elected deputy from Bologna as a radical Republican. In 1888 he abandoned this for the Dynastic party and was made undersecretary in the Ministry of the Interior. He was Minister of Agriculture and Commerce under Pelloux in 1898–99 and was Prime Minister and Minister of the Interior from March 1905 to February 1906. During his premiership the purchase of the railways was effected by the government.

FORTOUL, for-tool', **Hippolyte Nicholas Honoré,** French statesman: b. Digne, 1811; d. 1856. In 1845 he was appointed professor of the history of literature at the University of Toulouse, removing in a similar capacity to Aix in 1846. Three years later he was elected deputy from Les Basses Alpes and became one of the supporters of Louis Bonaparte. He was for a short time in the Ministry of Marine and after the *coup d'état* of Napoleon III, became Minister of Public Instruction. He stopped the courses of Jules Simon at the Sorbonne and suppressed other courses and professors in a high-handed manner. He introduced courses in farming in the primary schools and courses of drawing in the lycées. He published 'Grandeur de la vie privée' (1838); 'De l'art en Allemagne' (1841) and 'Etudes d'archéologie et d'histoire' (1854).

FORTRESS. See Fortifications.

FORTS. See Fortifications.

FORTUITISM (Lat. *fors,* chance), a doctrine or theory of causation which denies the existence of a final end or object in the course of things. Such a doctrine in the domains of nature results in theories such as that of Darwin, who has been charged with denying design in the changes and developments of organized creatures, that is, the design of a single controlling mind, namely, of a supernatural creator. The opposite to fortuitism is teleology (q.v.), which is the theory of a final end or object in the processes of nature and history, as resulting from the plan or scheme originating in the mind of the Supreme Being.

FORTUNA (Gr. Τυχή), the goddess of Fortune. According to Hesiod she was a daughter of Oceanus; according to Pindar, a sister of the Fates. She had temples at Corinth, Elis, and Smyrna, and worshipped in Italy before the building of Rome, and had a celebrated temple at Antium, in which were two statues, which were consulted as oracles, and gave responses either by signs or by lot. She had also a temple at Præneste, whence she was called *Dea Prænestina.* No less than 26 temples were erected to her in Rome, the first of which was built by Servius Tullius. She is generally delineated with two rudders, with one of which she guides the ship of prosperity, with the other that of misfortune. At a later period she was represented with a bandage over her eyes and had a sceptre in her hand, and sitting or standing on a wheel or globe. She is usually dressed as a matron. On a coin of the Emperor Geta she is represented sitting on the earth with her bosom bare, her right hand resting on a wheel, and holding in her left hand, resting on her lap, a horn of plenty. Consult Roscher, 'Mythological Lexicon.'

FORTUNATE ISLANDS. See Canary Islands.

FORTUNATIANUS, Atilius, Roman grammarian of the 4th century of the Christian era. For one of his pupils he wrote a treatise on Horatian metres. The work begins with a discussion of metres in general and the chief rules of prosody. The latter portion of the work is devoted to an anlysis of the metres of Horace. Fortunatianus was probably of African origin. Consult Keil, H., 'Grammatici Latini' (Vol. VI).

FORTUNATUS, Venantius Honorius Clementianus, bishop of Poitiers and poet: b. Ceneda, near Treviso, 530 A.D.; d. 609. He was educated at Milan and Ravenna with a view to excelling as a rhetorician and poet, in 565 he journeyed to France and took up his residence at the court of Sigbert. After two years he again traveled over France, but was finally induced to stay indefinitely at Poitiers. He was the friend of Gregory of Tours and of other eminent ecclesiastics, and in 599 was elected bishop of Poitiers. His poems were collected in 11 books and consist of hymns, epitaphs, epistles, verses in honor of his patrons. His best-known hymn is the 'Vexilla regis prodeunt,' sung at processions in the Catholic Church. He wrote a poem in four books in honor of Saint Martin, and lives of saints in prose. Consult Migne, 'Patrologiæ cursus completus' (Vol. LXXXVIII, Paris 1844–80) and Lives by Nisard (Paris 1880) and Meyer (Berlin 1901).

FORTUNATUS, the hero of a German collection of tales which originated about the end of the 15th century, though many of the tales and legends included in it are of much older date. The substance of the book is that Fortunatus and his sons after him were the possessors of an inexhaustible purse of gold and a wishing-cap, which however, in the end, proved the cause of their ruin. The moral is that worldly prosperity alone is insufficient to produce lasting happiness. The oldest printed edition of the book now extant bears the date 1509. Later German editions mostly bear the title, 'Fortunatus, von seinem Seckel und Wunsch-hütlein.' It has been reprinted in the third volume (1846) of Simrock's 'Deutsche Volksbücher.' Versions of the story have appeared in French, Italian, Dutch, Danish, Swedish and even Icelandic. The first to dramatize the subject was Hans Sachs, in 'Der Fortunatus mit dem Wunschseckel' (1553), after whom comes the English Thomas Dekker, with his 'Pleasant Comedie of Old Fortunatus' (1600), a work which made its reappearance in German about 1620. The most poetical edition of the story is that given by Tieck in his 'Phantasus.' Consult Schmidt, in Ersch and Gruber's 'Encyklopädie' (Sec. 1, Vol. XLVI).

FORTUNE, Robert, English author and botanist: b. near Berwick-on-Tweed, England, 1813; d. Scotland, 16 April 1880. He learned gardening in early life, and gained a position in the botanical garden at Edinburg. In 1842 he was appointed collector of plants for the Botanical Society of London in northern China. He published the results of his inquiries in his 'Three Years' Wanderings in the Northern Provinces of China' (1853). In 1848 the East India Company engaged him to visit China to compare the qualities and commercial value of different kinds of tea. He visited the East several times afterward and published an account of his numerous botanical discoveries in 'Two Visits to the Tea-countries of China' (1852); 'Residence Among the Chinese, Inland, on the Coast, and at Sea' (1857); 'Yedo and Peking' (1863).

FORTUNE, Temple of, a temple of ancient Rome and one of the best preserved monuments of that city, erected by Servius Tullius in the Forum Boarium, near the Pons Æmilia. It was rebuilt in the 3d century B.C. and in the 9th century A.D. was transformed into the church of Saint Mary of Egypt, the spaces between the pillars being filled up with masonry. It is pure Ionic style and was covered with painted stucco. Consult Platner, 'Topography and Monuments of Ancient Rome' (New York 1911).

FORTUNE BAY, a bay on the southern coast of Newfoundland, embracing extensive fishing grounds. By the fisheries treaty of 1871 with Great Britain (see FISHERIES QUESTION), the American fishermen were granted equal rights on all British coasts. The Newfoundlanders were very jealous of this intrusion on their fishing grounds, and in 1878 the Fortune Bay fishers attacked and drove away some Gloucester vessels. Demand was made on Great Britain for damages, and £15,000 was ultimately paid.

FORTUNE-TELLING, predicting the future or fortune of an individual, by means of alleged signs or indications noticed by the fortune-teller. Chiromancy or palmistry is the art of reading the lines or wrinkles on the palm of the hand, as indicative of the future for the person so marked. (See PALMISTRY). Necromancy is the art of consulting the dead about the future. In chartomancy playing cards are supposed by their suit or denomination, when turned up after being dealt out, to reveal coming events. The ancient astrologer used to decide from the stars the good or bad fortune of an individual, the hour and day of whose birth was taken as data in calculating the planetary conjunctions on which the horoscope was based. In every great city, even of the modern world, there are numbers of people who make a profession of fortune-telling, and there are many more who are credulous enough to believe in their pretensions. The law does not recognize the power of anyone to foretell the future, and the deluded victim of such charlatans, who had paid the wizard for a supposed revelation of the future, can bring the latter to justice for obtaining money on false pretenses. In the ancient world there was a strong belief in fortune-telling, or the power to predict the future. At Rome the government appointed official fortune-tellers of the state, who from the flight of birds or the appearance presented by the entrails of sacrificial victims made calculations as to coming events. The oracles of Delphi and Dodona were consulted by the wisest and best pagan Greeks. At Rome fortunes were told, or believed to be told, by Fortune herself in her temple at Antium. The literature of the Middle Ages is full of allusions to fortune-telling, which also played a part in the fiction and drama of all countries up to the middle of the 19th century. The belief in fortune-telling has largely disappeared among educated people. This results from the advances made in physical science, the views which prevail concerning causation, and the limits of human experience. Rationalism, in its newest form of agnosticism, has likewise cleared the intellectual atmosphere, and made delusion and imposture less and less liable to obtain a footing or exercise an influence over sane minds. There remains, however, a considerable body of people of various religions who believe to some degree in inspiration, prophecy and clairvoyance (q.v.), which latter is coming to be recognized by material science. See SECOND-SIGHT.

FORTUNES OF NIGEL, The, an historical novel, with scene laid in the London of James I, published by Sir Walter Scott in 1822. The introduction to this work contains interesting self-criticism by the author.

FORTUNY Y CARBO, nē ē kär'bō, **Mariano,** Spanish painter: b. Reus, near Barcelona, 11 June 1838; d. Rome, 21 Nov. 1874. He studied at Madrid, traveled in Morocco and settled at Rome, where he became the centre of a school of artists in revolt against over-study of the "masters." In 1866 he went to Paris, where his pictures, mostly genre subjects from Southern and Oriental life, had a great success. Among the best known are 'A Spanish Marriage'; 'A Fantasia at Morocco'; 'The Academicians at Arcadia'; 'The Seashore at Portici.' The Metropolitan Museum of New York contains his 'Lady in Black,' and 'Camels at Rest,' and many other pictures of his are contained in public and private American art collections. He was also known as an able etcher. Consult Lives by Davillier (1875), and Yriarte (1886); Muther, 'History of Modern Painting' (1890).

FORTY, a number that has sometimes been regarded as peculiarly significant. The idea may have originated with readers of the Bible, who notice that Moses was 40 days on the mount; Elijah was 40 days fed by ravens; the rain of the flood fell 40 days, another 40 days expired before Noah opened the window of the ark; 40 days was the period of embalming; Jonah gave Nineveh 40 days to repent; our Lord fasted 40 days. He was seen 40 days after his resurrection, etc.

The weather on Saint Swithin's Day portends, as it is foul or fair, 40 days' rain or dry weather; a quarantine extends to 40 days; 40 days, in the old English law, was the limit for the payment of the fine for manslaughter; the privilege of the sanctuary was for 40 days; the widow was allowed to remain in her husband's house for 40 days after his decease; a knight enjoyed 40 days' service of his tenant; a stranger at the expiration of 40 days was compelled to be enrolled in some tithing; members of Parliament were protected from arrest 40 days after the prorogation of the House, and 40 days before the House was convened.

FORTY IMMORTALS, The, the members of the French Academy. See INSTITUTE OF FRANCE.

FORTY-NINERS. See ARGONAUTS OF '49.

FORTY THIEVES, a band of robbers in the tale 'Ali Baba' in the 'Thousand and One Nights.' They dwelt in a cave, the door of which opened at the words «Open, Sesame.»

FORUM (Lat. for a market-place; connected with *foris,* out of doors), the open space in the centre of a city, in Roman times, where the people assembled, as on common ground, for amusement or the transaction of business. Here elections were held; here were the public buildings, civic and administrative. Included in the forum was the comitium, with its tribunals for the orators who addressed the people. The *curia* or Senate house stood, with other buildings, on the forum; and between the public edifices stretched lines of shops or *tabernæ.*

In the days of the kings and under the early republic there was but one forum in each city, small or great. In this open space all public business, political and legal, and all mercantile transactions were carried on. Dramatic representations, exhibitions of gladiators, combats of wild beasts and horse races also took place in the forum. The single forum eventually gave place to two forums, one of which was given up to law administration and politics, and the other to mercantile traffic. Eventually, each important commodity has its own forum. There was the *forum boarium,* cattle market; *forum suarium,* hog market; *forum olitorium,* vegetable market; and *forum piscarium,* fish market. The trade shops, as of gold- and silver-smiths, saddlers, blacksmiths, tinsmiths, money-lenders, booksellers, etc., were ranged round these fora, or occupied streets adjacent to them. The temples that edged the forum at Rome, like the mediæval cathedrals, were sometimes used for secular purposes. Thus, the Senate often held meetings in the Temple of Concord, while the Temple of Saturn was used as state treasury, and was also the depositary of public archives, before the erection of the Tabularium. There are a great many ruins which enable us to gain a fair idea of the fora of other cities besides Rome. The fora at Pompeii are as follows: the principal forum; 450 feet from north to south: in its north side was the Temple of Jupiter, the Basilica, or law court, and the temple of Apollo; on the west and on the east side the *macellum* (meat market), the *senaculum* or curia, the Temple of the Genius of Augustus, and the *Scholæ* or corporation building. The triangular forum, *forum triangulare,* contained a Doric temple to the south, and an Ionic portico at the entrance.

In the open spaces of the forum were set up many statues of distinguished men. Even in the days of the republic it was necessary to order the clearing out of such statues, together with crowds of altars, arches and memorial columns which blocked up the place.

The forum par excellence was of course the original Forum Romanum. It was situated in the hollow between the Palatine, Capitoline and Quirinal hills. The early tribes met on this common and neutral ground. Under the Tarquins the consolidation of the tribes is suggested by the completely adorned and enclosed appearance of the Forum. The Temple of Saturn appeared in 497 B.C., that of the Dioscuri in 484 B.C., that of Concord in 367 B.C. The first courthouse, Basilica Porcia, was not built before 184 B.C.; three more were built later, and it was this increase of buildings that occupied so much of the vacant space that the fish, meat, hog, vegetable and other markets were obliged to retire to other quarters of the city.

Julius Cæsar was the first to add special forums to those already in existence, and his Forum Julium was followed by the Forum Martis of Augustus, sometimes called Forum Augustus. Then came the Forum Pacis of Vespasian, the Forum Transitorium of Domitian and Nerva, the Forum Trajani of Trajan. These all lay side by side, north and east, with the Forum Romanum. The Forum Julium had in its centre a temple of Venus Genetrix, the patron goddess of the Julian gens round which it formed a sort of sacred precinct. The Forum Augustum was dedicated to Mars and in it was situated the Temple of Mars Ultor. This building was flanked by two triumphal arches, and Cæsar had intended that it should commemorate, with appropriate statues, the extension of Roman dominion. The Forum Nervæ was dedicated to Minerva and contained her temple. As the main thoroughfare through this district of the city crossed this forum it was commonly known as Forum Transitorium. The most gorgeous architectural group in the imperial city was exhibited in the Forum Trajani, which had its own special Basilica, like the great forum. It was entered by a triumphal arch, surrounded by a double colonnade; an equestrian statue of the emperor stood in the centre, flanked on each side by a half circle. The Library, Column and Temple of Trajan completed the cluster of marble structures.

The appearance of the Forum Romanum during the last days of the empire may be described as follows: Looking toward the Capitol the spectator would see the Temples of Concord, of Vespasian and the Dii Consentes. The Temple of Saturn stood between the slope of the Capitol and the Vicus Jugarius. Beside it was the arch of Tiberius, near that of Septimius Severus. Between these two arches were the rostra. The political buildings stood on the farther side of the arch of Severus. Here was the Senate house of the Curia, while the Temple of Janus rose side by side with the Basilica Æmilia. On the south and opposite side was the vast Basilica Julia, and the beautiful Temple of the Dioscuri. East from this group of buildings was an open space occupied by the Temple of Julius, side by side with which was the triumphal arch of Augustus, and beyond these is the most interesting tract of the old forum, the centre of antique and primitive Roman religion. The Shrine of Vesta, the Temple of Antoninus and Faustina, the Templum Urbis made up a magnificent range of noble and solemn structures, and we are reminded also that at this point once stood the arch of the Fabii at the opening of the ancient Via Sacra.

The invasions of the Goths/ did not bring much destruction upon the forum. It was in the 11th century that the buildings were devastated at the sacking of Rome (1084), when Gregory VII was delivered from the Castle of San Angelo by Duke Guiscard. The rarest monuments of the antique world were employed as fortresses. The 16th century witnessed the antiquarian curiosity and reckless vandalism of the Renaissance. The Forum of Cicero and Augustus became a wilderness with only a few isolated columns to mark the site of temples or palaces. Under the learned and liberal Pius VII the relics were preserved from further destruction and the archæologist Carlo Fea then began those excavations which have been continued by Lanciani.

In modern usage, the term forum has come to mean any public place for discussion, or trial, as the stage of an assembly room, the columns of a newspaper, a court of justice, etc.

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FORUM ALIENI. See Ferrara.

FORUM APPII, a post station on the Via Appia, 43 miles south of Rome. It was the usual halt at the end of the first day's journey from Rome. From here a canal paralleled the road through the Pomptine Marshes to the neighborhood of Terracina. It is mentioned as a halting-place in the narrative of Saint Paul's journey to Rome in Acts xxviii, 15. Few relics of antiquity have been found here; Pius VI re-established the post station here after the reconstruction of the Via Appia.

FORUM AUGUSTUM. See Forum.

FORUM BOARIUM. See Forum.

FORUM ECCLESIASTICUM, a church tribunal or court. It is either internal or external — *Forum Internum, Forum Externum.* The *Forum Internum* is what is known as the tribunal of penance, the confessional, where the penitent is both accuser and accused; and the confessor is the judge who condemns or acquits or pardons and exacts satisfaction for wrongs and reparation of injury done to others whether in reputation or property. The *Forum Externum* is any ecclesiastical tribunal outside of the sacrament of penance that is concerned with Church government. What are the sanctions by which the judgment of the Church's tribunals are enforced? Has the Church the right to inflict temporal pains and penalties on offenders against her laws? That the Church does possess such power is the teaching of the Church herself: the doctrine which declares she does not possess it has been explicitly condemned. The proposition that "the Pope or the whole Church collectively cannot punish any man, however wicked he may be, with a coercive penalty" unless the civil power gives them authority to do so, is condemned by Pope John XXII and a similar proposition was condemned by Pope Pius VII in the bull *Auctorem Fidei:* one of the propositions condemned by Pope Pius IX in the *Syllabus* (1864) declared that "the Church has no power to employ force." In proof of the necessity of such power in the Church, the case of a bishop is cited who teaches heretical doctrine: has not the Church, it is asked, power to depose him; or must the matter go before a tribunal of the civil power? It is held that to make such resort to the secular courts necessary is to render the Church powerless to execute her divine commission and to make a civil judge the judge of a purely ecclesiastical cause. On the ground of the canon law the Church has the right in herself "to inflict stripes, to impose fines, to imprison in a monastery" offenders against her laws; in short, to impose all penalties short of the effusion of blood, *citra sanguinis effusionem,* or its equivalent. Practically, the power of the Church at present is confined to the infliction only of her spiritual penalties, and these only when they do not in any degree directly or indirectly impair the civil rights of the person who incurs the spiritual censures; when they do so trench his civil rights, the person has recourse to the secular courts. Thus in this country cases are often brought into the civil tribunals of rectors of parishes or pastors of churches who have been deposed by bishops or other ecclesiastical superiors; and courts find it within their competence to decide whether the act of the superiors has been done in entire conformity with the constitution and laws of the religious body concerned, and the civil and contractual rights of the complainant.

FORUM JULII. See Friuli.

FORUM JULIUM. See Forum.

FORUM LIVII. See Forli.

FORUM OF NERVA. See Forum.

FORUM OBLITORIUM. See Forum.

FORUM PACIS. See Forum.

FORUM ROMANUM. See Forum.

FORUM OF TRAJAN. See Forum.

FORWARD, Walter, American statesman: b. Connecticut, 1786; d. Pittsburgh, 24 Nov. 1852. He studied law and was admitted to the bar in 1806. In 1822 he was elected to Congress; and in 1841 was appointed by President Harrison first Comptroller of the Treasury, and was reappointed by President Tyler in September of the same year. On retiring from the Cabinet in 1843 he resumed law practice. In 1849 he was appointed chargé-d'affaires to Denmark, but resigned in 1851. Later he was presiding judge of the Allegheny County District Court.

FORWOOD, William Henry, American military surgeon: b. Delaware, 7 Sept. 1838; d. Washington, D. C., 11 May 1915. He was graduated at the medical department of the University of Pennsylvania and at Georgetown University, Washington, D. C.; entered the regular army as an assistant surgeon in 1861 and served throughout the Civil War. He also served in many Indian campaigns; was surgeon and naturalist with the exploring expedition through Wyoming, Montana and Idaho in 1883; located military hospitals in Savannah, Ga., and the camp hospitals in Montauk Point, during the Spanish War; and was appointed surgeon-general of the army with the rank of brigadier-general in 1902. He retired on 7 Sept. 1902 and became professor of surgical pathology at Georgetown Medical College. He wrote many articles on military surgery and natural history.

FOSCARI, fŏs-kä'rē, **Francesco,** Doge of Venice: b. 1373; d. Venice, 1 Nov. 1457. In 1416 he was named procurator of Saint Mark's, and in 1423 was elected Doge. His son Giacopo, being accused of ordering the assassination of a Senator Donati, the enemies of the family created such commotion in the state that, unable to clear himself to their satisfaction of the charge, he was banished from the city, the father having to ratify the sentence. Love of his country and devotion to his wife compelled the banished Foscari at all hazards to revisit his beloved Venice, where, being discovered by his enemies, he was denounced, again made prisoner, put to the question of the rack, and a second time banished, dying soon after of his wounds, or the torments of his secret punishment, and of grief at separation from his idolized family. The fate of the son had such an effect on the Doge that the bereaved father went mad, in which state the enemies of his family compelled him to abdicate. He died three days after in a spasm, upon hearing the bells of Saint Mark's announce to Venice the election of a new ruler. Byron has written on the subject a tragedy entitled ‘The Two Foscari.’

FOSCOLO, Ugo, oo'gō fŏs'kō-lō, originally **NICCOLO,** Italian author: b. Zante, one of the Ionian isles, 26 Jan. 1778; d. Turnham Green, near London, 10 Oct. 1827. A man of passionate temperament, and withal an ardent patriot, Foscolo was bitterly disappointed when by the Treaty of Campo Formio Venice was given to Austria, and his disappointment found vent in the ‘Lettere di Jacopo Ortis’ (1802), a sort of political Werther. Becoming finally undeceived as to Napoleon's intentions with regard to his native land, he returned to Milan, where he published in 1807 his best poem, ‘I Sepolcri,’ a work composed in the spirit of the ancient classic writers, and remarkable for its smooth and polished versification. About this time he wrote a translation of Sterne's ‘Sentimental Journey,’ and two tragedies, ‘Ajace’ and ‘Ricciarda,’ both showing political tendencies. In 1809 he was appointed to the chair of eloquence in Pavia. His inaugural address, ‘Dell' Origine e dell' Ufficio della Letteratura,’ although full of the same love of classic beauty which marks the ‘Sepolcri,’ is turgid and affected in style. When in 1814 the Austrians entered Milan, Foscolo withdrew to Switzerland, and in 1816 he went to London. There some of his best writings were published, namely, ‘Essays on Petrarca’; ‘Discorso sul testo del Decamerone’; ‘Discorso sul testo di Dante.’ His remains were finally deposited in the church of Santa Croce, Florence, in 1871. His works and letters were published at Florence in 12 volumes by Le Monnier (1850–62). (See LAST LETTERS OF JACOB ORTIS, THE). Consult Lives by Pecchio (1836); Carrer (1842); Artusi (1878); Antona Traversi (1884); and De Winckels (1885–86); Hazlitt, ‘The Venetian Republic’ (1901).

FOSDICK, Charles Austin (“HARRY CASTLEMON”), American writer of juvenile books: b. Randolph, N. Y., 6 Sept. 1842; d. Westfield, N. Y., 22 Aug. 1915. He served in the Union navy in the Civil War from 1862 to 1865. Besides contributions to periodicals, he has published under the pseudonym “HARRY CASTLEMON” over 30 books for boys, among which are ‘The Gunboat Series’ (1864–68); ‘Rocky Mountain Series’ (1868–71); ‘Rod and Gun Series’ (1883–84); ‘The Buried Treasure’; ‘The Steel Horse’; ‘Jack the Trader’; ‘The Houseboat Boys’; ‘The Mystery of Lost River Canyon’; ‘The Young Game Warden’; ‘Rebellion in Dixie’; ‘The Ten-Ton Cutter’; ‘The Pony Express Rider’; ‘Carl the Trailer,’ etc.

FOSDICK, James William, American artist: b. Charlestown, Mass., 13 Feb. 1858. He was educated in the public schools of Boston and studied art at the school of Boston Museum of Fine Arts and from 1881 to 1888 studied drawing and painting in Paris. He specialized in mural painting and pyrography and is the founder of the art of fire etching in America. He decorated many private residences in New York and elsewhere. His principal works are ‘Glorification of Joan of Arc’ in the National Gallery of Fine Arts, Washington; ‘Portrait of Louis XIV’ in Pennsylvania Academy of Fine Arts; and ‘Arethusa.’ He has published ‘The Honor of the Braxtons’ (1902) and has contributed stories, travels and art articles to the *Century, Saint Nicholas* and other magazines.

FOSS, Eugene Noble, American public official: b. West Berkshire, Vt., 24 Sept. 1858. In 1877–79 he studied at the University of Vermont, engaged in manufacturing at Boston in 1882 and was interested in various commercial enterprises. Since 1902 he has been prominent as an advocate of tariff revision and reciprocity. In 1910 he was elected to the 61st Congress as a Democrat. In the same year he was elected governor of Massachusetts, securing re-election in 1911 and 1912. He was defeated at the election of 1913 partly because of his hostility to trades unions during his last term of office.

FOSSA, or **FOUSSA,** a large, brown, unstriped carnivorous mammal of Madagascar (*Cryptoprocta ferox*), which has the form of a huge weasel (twice the size of a house-cat), and like a weasel is lithe, active and bloodthirsty. Its systematic place is by no means decided. It is placed by Beddard as representing a distinct sub-family of the civets; while Mivart and Lydekker regard it merely as a genus of civets. It differs from the civet, however, in that its tail is incompletely ringed, and it has no scent-pouch. Zittel, in view of its dentition and the retractibility of the claws, among other features, regards it as occupying an intermediate place between the civets and the cats, and associated with such composite extinct forms as *Dinictis, Proœlurus* and *Pseudœlurus,* but classifies it in the *Felidæ*. It is the largest carnivore in Madagascar, nocturnal in its habits, and preys chiefly on birds and lemurs.

FOSSANO, Italy, town in the province of Cuneo, 15 miles northeast of Cuneo, on the Stura, 1,235 feet above sea-level. It has an ancient castle, cathedral, seminary, gymnasium, an academy of science, etc. Silk, leather, gunpowder, paper and baskets are manufactured. It belonged to the house of Savoy after 1340 and was the scene of conflicts between the Austrians and French in 1796 and 1799. Pop. 18,731.

FOSSE (or FOSS) WAY, early English name of a Roman series of roads in Britain, running from Lincoln by Leicester and Bath to Exeter. Almost the entire line is still in use as modern road. Consult Codrington, 'Roman Roads in Britain' (London 1903).

FOSSIL FOOTPRINTS. See ICHNOLOGY.

FOSSIL FORESTS. See FORESTS, PETRIFIED.

FOSSIL PLANTS. See PALEOBOTANY.

FOSSIL VERTEBRATES. See FOSSILS; PALEONTOLOGY.

FOSSILIFEROUS ROCKS, rocks in which are found embedded the petrified remains, or molds of plants and animals. See FOSSILS; PALEONTOLOGY, etc.

FOSSILS, the impressions or remains of plants or animals preserved in rocks by natural causes. Fossils supply data, from which the geologist can determine the relative ages of sedimentary rocks. The first man to realize their chronological importance was the English surveyor, William Smith, known as the father of historical geology, although acute observers like Leonardo da Vinci had pointed out long before that fossil shells were not freaks of nature, but had been laid down where found in the sediments of some body of water.

Most fossil remains are of marine types; many are of fresh-water and land-and-water types; comparatively few are of land types. The reason is plain. Animal remains lying on the ground are eaten by animals, or if not eaten, soon decay, and the bony skeleton, if buried by sand or loam, is slowly dissolved by percolating water. Plant remains decay even more rapidly. In water, decay is retarded. Thus mastodon remains have been found in swamps where the animals were occasionally mired, but of the infinitely greater number of mastodons that died on drier ground no trace is left. Old lake beds are frequently rich in plant and animal remains. Fishes, insects, birds and land animals, and the leaves, flowers and fruits of trees are preserved in the fine-grained shales or the sands and clays of the lake deposits in several Western States. It is evident in many cases that the animals have been drifted into the lake by rivers; and in some cases large deposits of disjointed skeletons of many species are found jumbled together. In old swamps plants formed thick masses of vegetable matter, now turned to coal, imprints of leaves and stems being common in the shale overlying a coal-seam. In the sea, conditions are most favorable for the preservation of organic remains, and marine deposits have formed thick and extensive beds. Hence, of all the fossils found, marine types are most numerous. Fossils are preserved in several ways, which may be classified under four heads. (1) Some of the original substance may be preserved, as the carbon in a leaf, or in the bone or shell of some animal. (2) All the original substance may dissolve away, but its shape may be preserved. This may happen in two ways: (*a*) the external form may be preserved in the sediments, forming a mold, or (*b*) the internal form may be preserved, forming a cast. A mollusk dies; its soft parts decay; the interior of the shell fills with sand or ooze; the shell is deeply buried. The sediments consolidate; the calcareous material of the shell may dissolve; but both its external and internal form are preserved. (3) Less commonly the structure of organic remains is preserved by a true petrifaction, the organic substance being replaced, atom by atom, by some mineral compound, like silica or calcium carbonate. A striking illustration of this method of preservation is fossil wood, in which the replacing silica preserves minute details of structure. (4) In certain circumstances animals of long past ages may be preserved unchanged wholly or in part by a fortunate accident. The Siberian mammoths and woolly rhinoceroses frozen into perpetual ice, and the insects protected from decay in the Baltic amber and other ancient resins, are good examples, elsewhere described.

The study of fossils (palæozoology, palæobotany) has carried our knowledge of the life of the globe back to its beginning, and illustrated by actual examples the steps in its evolution. It has also, by means of chemistry and the microscope, taught zoologists many new things in respect to anatomy and histology. Finally, the delicate art of extracting fossils from their matrix, and preparing them for intelligent use, has developed a technique that amounts to a regular industry in connection with museums. See COAL; CORAL ISLANDS; GEOLOGY; PALEONTOLOGY; PALEOBOTANY.

ERNEST INGERSOLL.

FOSSOMBRONE, Italy, city in the province of Pesaro e Urbino, 10 miles north of Urbino, in the valley of the Metauro. It has a splendid 15th century cathedral, which has a high altar by Domenico Rosselli. It contains also a library, technical school and a mediæval castle. Two miles to the northeast are the ruins of the Roman Forum Sempronii, from which the city is named. Silk and oil manufacturing are the chief industries. Pop. 9,701.

FOSTER, Ben(jamin), American artist: b. North Anson, Me., 1852. A pupil in New York of Abbott Thayer, and in Paris of Luc Oliver Merson and Aimé Morot, he obtained various recognition of his excellence in landscape, including a bronze medal at the Paris Exposition of 1900; the Webb prize of the Society of American artists in 1901, and the Inness gold medal of the National Academy of Design in 1908. Among his works are ‘Mists of the Morning,’ for which he received the Webb prize, and ‘Night Scene at the Paris Exposition,’ purchased by the French government for the Luxembourg Gallery. ‘Lulled by the Murmur of a Brook’ is also in the Luxembourg Gallery and he is represented in the Brooklyn Institute Museum by ‘Misty Moonlight Night’ and in the Metropolitan Museum, New York, by ‘In the Connecticut Hills’ (1914).

FOSTER, Charles, American legislator and Cabinet officer: b. near Tiffin, Ohio, 12 April 1828; d. Springfield, Ohio, 9 Jan. 1904. He entered a mercantile career at Rome, now Fostoria, Ohio, and became the proprietor of the largest country business in the State. At the time of the Civil War he was active in the recruiting of troops. In 1870 he was elected to Congress in a district previously strongly Democratic, and in 1872, 1874 and 1876 was rechosen. While in Congress he was for some time a member of the Ways and Means Committee. He was elected governor of Ohio in 1879, and again in 1881, his administration being marked by special attention to the nonpartisan management of public institutions. In 1891 he was appointed Secretary of the Treasury by President Harrison, and in that post he negotiated a loan of $25,364,520 at the unprecedentedly low rate of 2 per cent. Subsequently he was a commissioner on several diplomatic missions of importance and performed his duties with great skill and satisfaction to his government.

FOSTER, Sir Clement Le Neve, English mineralogist: b. Camberwell, 23 March 1841; d. London, 19 April 1904. He was educated at Boulogne and Amiens and at the Royal School of Mines in London, also at the Mining College of Freiburg, Saxony. In 1860 he joined the Geological Survey in England, spending five years in field work. After 1865 he devoted his attention to mineralogy and mining in Cornwall, Egypt and Venezuela. In 1872 he was made inspector of mines in England and in 1890 became professor of mining at the Royal College of Science. In 1892 he became a Fellow of the Royal Society and was knighted in 1903. He published ‘Ore and Stone Mining’ (7th ed., 1910); ‘Elements of Mining and Quarrying’ (1903).

FOSTER, David Skaats, author and merchant: b. Utica, N. Y., 23 Jan. 1862. He received a public school education and is the head of David S. Foster Sons & Co., iron and coal merchants. He is master of half a dozen languages, and has published ‘The Romance of the Unexpected’; ‘Rebecca the Witch’; ‘Elinor Fenton’; ‘Spanish Castles by the Rhine’; ‘Prince Timoteo’; ‘Flighty Arethusa’; ‘The Road to London’; ‘The Divided Medal’; ‘Our Uncle William’; ‘Nate Sawyer’; ‘The Kidnapped Damozel’; ‘The Oval Diamond’; ‘Alraschid in Petticoats.’

FOSTER, Frank Hugh, American Congregational clergyman: b. Springfield, Mass., 18 June 1851. He was graduated at Harvard in 1873, and at Andover Theological Seminary in 1877. He was ordained to the Congregational ministry in 1877. In 1882–84 he was professor of philosophy at Middlebury College, and from 1884 to 1892 was professor of Church history at Oberlin Theological Seminary. From 1892 to 1902 he was professor of systematic theology at the Pacific Seminary, Berkeley, Cal. In 1904 he removed to Olivet, Mich., as pastor of the college and church there, and since 1907 has been professor of history at Olivet College. He published ‘Seminary Method of Study in the Historical Sciences’ (1888); ‘Fundamental Ideas of the Roman Catholic Church’ (1899); ‘Christian Life and Theology’ (1900); ‘Genetic History of the New England Theology’ (1907). He was joint editor of *Bibliotheca Sacra* and a contributor to other reviews and religious periodicals.

FOSTER, George Burman, American clergyman and theologian: b. Alderson, W. Va., 2 April 1858. He was graduated from the University of West Virginia (1883) and the Rochester Theological Seminary (1887). Later he studied at Göttingen and Berlin. He entered the ministry of the Baptist Church 1879 and was pastor at Saratoga, N. Y., 1887–91. He was professor of philosophy at McMaster University 1892–95. In 1895 he went to Chicago University, where he has been ever since. He served first as professor of systematic theology, but since 1905 has been professor of the philosophy of religion. He is the author of ‘The Finality of the Christian Religion’ (1906); ‘The Function of Religion in Man's Struggle for Existence’ (1909).

FOSTER, Sir George Eulas, Canadian statesman: b. Carleton County, New Brunswick, 3 Sept. 1847. He graduated at the University of New Brunswick in 1868, studied also at Edinburgh and Heidelberg, was professor of classics and history in the University of New Brunswick in 1872–79, and in 1882 was elected to the Canadian Parliament. From 1885–88 he was Minister of Marine and Fisheries; from 1888–96 Minister of Finance; and in 1911 he accepted the portfolio of Trade and Commerce in the Borden administration. He is one of the finest debaters the Canadian House of Commons has ever produced, with almost unrivalled powers of criticism, and as a platform orator he is strong and effective. He was created K. C. M. G. in 1914.

FOSTER, Isaac, American physician and surgeon: b. Charlestown, Mass., 1740; d. 1781. He was graduated at Harvard in 1758, went to London and Paris to prosecute his studies in medicine, and on his return established his practice in Charlestown. In 1774 he was a delegate to the Massachusetts Provincial Congress and on the break with England joined the Continental army as volunteer surgeon. In 1775 Washington made him acting director-general of the military hospital system. Two years later he was surgeon in chief of the Eastern Department. Ill health obliged him to retire in 1780.

FOSTER, John, English essayist: b. Halifax, Yorkshire, 17 Sept. 1770; d. Stapleton, near Bristol, 15 Oct. 1843. A Baptist clergyman, self-educated and with an advanced point of view, he contributed to the *Eclectic Review* regularly as well as delightfully; but his volume of ‘Essays’ (1805) constitutes his chief title to recognition. Four in number, these compositions are, respectively, 'On a Man's Writing Memoirs of Himself'; 'On Decision of Character'; 'On the Application of the Epithet Romantic'; and 'On Some of the Causes by which Evangelical Religion has been Rendered Less Acceptable to Persons of Cultivated Taste.' All are marked by great solidity and depth of thought, combined with a lucidity and nervousness of style which no English author has surpassed. Of the four essays the palm is generally given to that 'On Decision of Character,' though in the opinion of Robert Hall the fourth of the series was the work on which Foster's fame with posterity would rest. As a preacher Foster never succeeded in attracting much attention. His discourses, though solid and philosophical, were of too abstract and unadorned a nature to be readily appreciated by a popular audience. In 1817 he wrote his 'Essay on the Evils of Popular Ignorance,' in which he exposed the fearful condition of the masses in the large towns of England, and strenuously urged the establishment of a national system of education.

FOSTER, John Gray, American military officer: b. Whitefield, N. H., 27 May 1823; d. Nashua, N. H., 2 Sept. 1874. He was graduated at the United States Military Academy in 1846, entering the engineer corps. In the Mexican War he was seriously wounded at Molino del Rey. At the outbreak of the Civil War he was assigned to duty at Fort Sumter and was one of its garrison during the siege. In 1861 he was commissioned a brigadier-general of volunteers; took a leading part in the capture of Roanoke Island in 1862; was promoted major-general of volunteers; and became commander of the Department of North Carolina, defending that region with skill. Subsequently he commanded the Departments of Ohio and Florida, and in 1865 was brevetted major-general, United States army. Later he was placed in charge of engineering projects in the East, notably in Boston Harbor and Portsmouth.

FOSTER, John Watson, American statesman and diplomat: b. Pike County, Ind., 2 March 1836; d. Washington, D. C., 15 Nov. 1917. The son of Judge Matthew Watson Foster, he was educated at the University of Indiana and the Harvard Law School. He served in the Civil War and was promoted for gallantry at Fort Donelson and Shiloh. For some years after the war he edited the Evansville *Daily Journal* and later acted as postmaster of the town and chairman of the State Republican Committee. From 1873 to 1880 he was Minister to Mexico, then to Russia for a short time, and from 1883 to 1885 in Spain. As special plenipotentiary he negotiated treaties with the British West Indies, Spain and Germany, and became Secretary of State in 1892, in succession to Blaine, who had resigned after his quarrel with President Harrison. Foster made a treaty with the Americans in Hawaii providing for the annexation of the islands, which was withdrawn by President Cleveland before it could be ratified. At the Bering Sea arbitration held in Paris Mr. Foster represented the United States and at the invitation of the emperor of China he took part in the peace negotiations which ended the Chino-Japanese War by the Treaty of Shimonoseki in 1895. He was afterward entrusted with a special mission for the United States to Great Britain and Russia and was successively appointed a member of the Anglo-Canadian Commission and United States agent at the Alaska Boundary Tribunal. A remarkable tribute was paid Mr. Foster in 1907 when, by request, he represented the Chinese government at the second Hague Conference. In 1916, on Foster's 80th birthday, the late President Yuan Shi Kai of China conferred the Order of the Golden Grain upon him — a very rare distinction. Mrs. Robert Lansing is a daughter of Mr. Foster. The following works were published by Mr. Foster: 'American Diplomacy in the Orient'; 'A Century of American Diplomacy'; 'Arbitration and The Hague Court'; 'Diplomatic Memoirs'; 'The Practice of Diplomacy.'

FOSTER, John Wells, American geologist: b. Brimfield, Mass., 1815; d. 1873. He was graduated at Wesleyan University in 1834 and having removed to Ohio studied law and was admitted to the bar there; in 1837 became an assistant in the Geological Survey of Ohio; and in 1847 was appointed an assistant to Professor Jackson in a survey of the region about Lake Superior. The results of this survey, executed in connection with J. D. Dana, appeared in several volumes published by authority of Congress. Foster aided in the organization of the Republican party in Massachusetts and from 1858 was resident in Chicago, where he made a notable study of the ethnology and palæontology of the Mississippi Basin. Among his works are 'The Mississippi Valley' (1869); 'Prehistoric Races of the United States' (1873).

FOSTER, Lafayette Sabine, American statesman: b. Franklin, Conn., 22 Nov. 1806; d. Norwich, Conn., 19 Sept. 1880. He was graduated at Brown University in 1828 and admitted to the bar in 1830; took an active part in Connecticut politics and was elected to the legislature in 1839, serving several terms. He was elected to the United States Senate in 1854; was president pro tempore of the Senate in 1865; and, after Andrew Johnson became President, was acting Vice-President of the United States. His senatorial term expired in 1867, but on account of his moderate and conservative course in the Senate his re-election was strongly opposed and he withdrew his name. In 1870 he was again elected to the State legislature, but resigned in June of that year to take his seat on the bench of the Connecticut Supreme Court. In 1878 he was appointed a member of the commission to devise simpler forms of legal procedure for State courts and in 1878–79 was commissioner from Connecticut to settle the disputed boundary question with New York.

FOSTER, Myles Birket, English painter: b. North Shields, 1825; d. 1899. In 1839 he was apprenticed to Ebenezer Landells, a wood engraver of some repute. Here he learned the graver's art and contributed designs and cuts for the *Illustrated London News* and *Punch*. At the age of 21 he established himself in business, and received commissions to illustrate Gray's 'Elegy,' 'The Ancient Mariner,' 'Old English Ballads,' 'Evangeline,' 'L'Allegro,' 'Il Penseroso and Goldsmith's 'Traveler,' About 1860 he became interested in water colors and soon devoted himself entirely to this art.

He was fond of body colors, and executed his work with extreme delicacy of detail and finish. Landscapes, rustic figures, children and country scenes furnished the themes for his paintings. He became exceedingly popular, and in 1862 was elected member of the Royal Society of Painters in Water Colors at whose exhibits his works were given a prominent place. ‘Bird's Nest,’ ‘Feeding the Ducks,’ ‘Castle of Rheinfels’ and ‘In Full Cry’ are among the most important of his paintings. Consult Huish, M. B., ‘Birkert Foster, his Life and Work’ (in the *Art Journal* 1890); and Cundall, H. M., ‘Birket Foster, R. W. S.’ (London 1906).

FOSTER, Robert Frederick, American authority on card games: b. Edinburgh, Scotland, 31 May 1853. He followed the professions of architect and civil engineer until 1893, when he became a writer on games of cards. Since 1895 he has been card editor of the New York *Sun*. He is the inventor of Foster's whist markers and of self-playing whist and bridge cards and originated the «eleven rule» at bridge. He has published ‘Foster's Whist Manual’ (3d ed., 1894); ‘Whist Tactics’ (1895); ‘Foster's Complete Hoyle’ (1909); ‘Foster's Bridge Manual’ (3d ed., 1908); ‘Foster's Bridge Tactics’ (1903); ‘Bridge Maxims’ (1905); ‘Practical Poker’ (1905); ‘Call-ace Euchre’ (1905); ‘Foster's Skat Manual’ (1906); ‘Auction Bridge’ (3d ed., 1910); ‘Cab No. 44,’ a novel (1910); ‘Royal Auction Bridge’ (1914); ‘Cooncan’ (1913).

FOSTER, Robert Verrell, American theologian: b. Wilson County, Tenn., 12 Aug. 1845; d. Lebanon, Tenn., 27 Jan. 1914. He was educated at Cumberland University (Lebanon, Tenn.), and the Union Theological Seminary, and after 1877 was professor in the former, originally of Hebrew and New Testament Greek, subsequently of systematic theology. Of his publications may be named ‘Old Testament Theology’ (1890); ‘Systematic Theology’ (1898); ‘Commentaries on International Sunday School Lessons’ (1881–95); also many articles for the daily and periodical press.

FOSTER, Roger, American lawyer: b. Worcester, Mass., 1857. He studied at the University of Marburg, Yale and the Columbia Law School, in 1880 was admitted to the New York bar, and was special counsel to the board of health of New York in 1896–98. He has been retained as counsel in many important cases. His writings include, besides many pamphlets and articles in periodicals, ‘A Treatise on Federal Practice’ (1890–92); ‘A Treatise on the Income Tax of 1894’ (1895); and numerous pamphlets and articles in periodicals and a treatise on the Income Tax of 1913.

FOSTER, Stephen Collins, American songwriter: b. Pittsburgh, Pa., 4 July 1826; d. New York, 13 Jan. 1864. He was educated at Athens Academy and Jefferson College, Pennsylvania. He composed the music and wrote the words of over 125 popular songs and melodies, among which are ‘Old Folks at Home’; ‘Nelly Gray’; ‘Old Dog Tray’; ‘Come Where My Love Lies Dreaming’; ‘Suwanee River,’ etc.

FOSTER, Stephen Symonds, American abolitionist: b. Canterbury, N. H., 1809; d. 1881. He was graduated at Dartmouth College in 1838; studied theology at the Union Seminary, became an anti-slavery orator and was known for his radical methods. His attacks upon the Church for its position in regard to abolition aroused hostility against him and his practice of interrupting church services was the cause of several mob disturbances. He published ‘The Brotherhood of Thieves: A True Picture of the American Church and Clergy’ (1843).

FOSTER, Theodosia Toll («FAYE HUNTINGTON»), American author: b. Verona, N. Y., 1838. She was married to James H. Foster 1869. She was educated at the Oneida Seminary, and was for many years principal of a school at Verona. From 1890 to 1906 she was president of the Women's Christian Temperance Union of Oneida County, N. Y. She has also held the office of secretary in the Women's Board of Home Missions of the Presbyterian Church of America. She became blind in 1911. Her works include a long series of volumes of action, such at ‘Mr. McKenzie's Answer’ (1876); ‘Ripley Parsonage’ (1877); ‘From Different Standpoints’ (1878); ‘Echoing and Re-Echoing’ (1879; new ed., 1906); ‘Mrs. Dean's Way’ (1880); ‘Millerton People’ (1884); ‘What Fide Remembers’ (1885); ‘The Boynton Neighborhood’ (1895); ‘A Modern Exodus’ (1897); ‘His First Charge’ (1897); ‘Lewis Elmore — Crusader’ (1898); ‘Opportunity Circle’ (1901); ‘A Break in Schedule Time’ (1901); and ‘Those Boys’ (1903).

FOSTER, William Trufant, American educator: b. Boston, 18 Jan. 1879. He was graduated at Harvard in 1901. In 1901–03 he was instructor in English at Bates College and in 1904–10 at Bowdoin. In 1910 he became president of Reed College, Portland, Ore. In the summer of 1909 he lectured on the principles of education at Harvard and at Columbia in 1911. He has published ‘Argumentation and Debating’ (1908); ‘Administration of the College Curriculum’ (1910); ‘Essentials of Exposition and Argument’ (1911); ‘Social Hygiene and Morals’ (1913).

FOSTORIA, Ohio, city in Seneca and Hancock counties, 35 miles from Toledo, on the Baltimore and Ohio and Lake Erie and Western railroads. In the midst of a rich agricultural region with valuable oil fields, it is a thriving manufacturing centre whose development is largely due to Charles W. Foster, father of Charles Foster, governor of Ohio (1880–84) and Secretary of the United States Treasury (1891–93). The United States census of manufactures for 1914 showed within the city limits 47 industrial establishments of factory grade, employing 1,498 persons; 1,252 being wage earners receiving annually a total of $635,000 in wages. The capital invested aggregated $3,121,000, and the year's output was valued at $6,125,000: of this, $1,736,000 was the value added by manufacture. The output includes flour, planing mill products, glass, lime, incandescent lamps, automobile engines and parts, and railway torpedoes. It operates municipal waterworks, has a Carnegie library and handsome Y. M. C. A. building. The administration is by a mayor elected every two years and a city council, with public service and public safety departments. Pop. 10,000.

FOTCHA. See Foca.

FOTHERINGHAY CASTLE, the site of which was near Peterborough, England, 27 miles northeast of Northampton. The castle to which a melancholy interest attaches as the scene in 1587 of the imprisonment, trial and execution of Mary Queen of Scots, was demolished by her son James I. Several of the illustrious Plantagenets are buried in its church.

FÖTTINGER, fĕt'tin-gĕr, **Hermann,** German engineer; b. Nuremberg, Germany, 1877. He received his education at the gymnasium of Nuremberg and at the technical institute of Munich. In 1899 he became engaged in the construction of ship machinery and in 1906 was awarded a silver medal for his turbine inventions. Since 1909 he has been professor at the Royal Technical Institute of Danzig. He wrote 'Effektive Machinenleistung und effektives Drehmoment und deren experimentelle Bestimmung' (1904).

FOUCAULT, foo-ko, **Jean Bernard Léon,** French scientist: b. Paris, 18 Sept. 1819; d. there, 11 Feb. 1868. He was scientific editor of the *Journal des Débats* from 1845, in 1854 became physicist to the Imperial Observatory, and in 1855 received the Copley medal of the Royal Society of London for his measurement of the velocity of light, and in 1864 became an officer of the Legion of Honor. His inventions include a device much used in the employment of the electric light in microscopic and optical researches. He also demonstrated (1851) by means of the pendulum and the gyroscope the rotation of the earth upon its axis. Consult Lissajous, 'Notice historique sur la vie et les Travaux Scientifiques de Léon Foucault' (Paris 1875). See Foucault Currents; Foucault's Pendulum Experiment.

FOUCAULT CURRENTS, or EDDY CURRENTS, are electrical currents generated by induction within the substance of a massive conductor that is moving in a magnetic field, or which is exposed to the influence of a variable field. If the conductor is filiform, like a wire, no current can be produced in it save in the direction of its length. If a massive conductor be thought of, however, as composed of an infinite number of closed circuits, each composed of a single wire and all tangled up and then melted into a solid mass, it is evident that (in general) currents will be induced in all of these imaginary circuits when the conductor moves, or when the field to which it is subjected varies. In the actual case the conductor is not composed of wires melted together, but currents are nevertheless generated within it just as though these wires had an actual objective existence. Mathematical equations can in fact be written down, from which it is possible to compute the direction and intensity of the current that is flowing, at any given instant, through any proposed point of a conductor in a known but varying field. Such calculations are seldom made outside of college classrooms, however, because it is known from the general principle of the conservation of energy that the direction of the Foucault currents is everywhere such as to oppose the change (of whatever sort it may be) which produces them. Hence such currents tend to diminish the efficiency of all motors, dynamos and transformers in which they occur and designers therefore strive to avoid them so far as possible. In armatures and in transformers, for example, it is customary to laminate the masses of iron that are exposed to changing fields, the individual parts being insulated from one another by air gaps or otherwise and their surfaces of separation disposed (as nearly as practicable) so as to be perpendicular to the direction in which the Foucault currents tend to flow. In galvanometers, masses of copper are often purposely disposed near the sensitive needle with distinct advantage; for while they do not affect the total deflection of the needle, they cause it to come to rest very quickly after the circuit is broken, the motion of the needle inducing Foucault currents in the copper, which tend always to bring the needle to rest. The energy that is expended in the generation of Foucault currents is transformed into heat and raises the temperature of the mass within which the currents are flowing. The name refers to the French physicist, Jean Bernard Léon Foucault (q.v.), who studied the subject with much care.

FOUCAULT'S PENDULUM EXPERIMENT, a curious and remarkable method invented by Jean Bernard Léon Foucault (q.v.), of showing rotation of the earth on its axis, by observing a vibrating pendulum and his experiment goes under the above name. In this experiment a gradual disc is seen to turn, while a pendulum freely suspended maintained its plane of oscillation. If a heavy ball is suspended by a fine wire and set to vibrate like a pendulum, it may easily be shown, either mathematically or by experiment, that the point of suspension, with the wire and ball, may be rotated round an axis, passing along the length of the wire without interfering with the vibration. In other words, the pendulum will continue to vibrate in the same plane, although the point of suspension be turned round the axis of suspension. It follows immediately from this that if we could suspend a pendulum at the north or south pole and set it vibrating it would continue to swing in the original plane of vibration; and as the earth is turning on its axis, a marked line on the earth's surface would appear to turn underneath the pendulum; or rather, it would seem to an observer, accustomed to feel as if the earth were at rest, that the plane in which the pendulum vibrates turns round relatively to the marked line on the earth's surface. It is easily shown that a similar phenomenon may be observed in any latitude except at the equator; the amount of rotation, however, that the plane of vibration of the pendulum seems to undergo is not so great in low latitudes as in high latitudes; but still in our latitudes rotation takes place to an extent easily observable. The performance of this experiment requires the greatest nicety. The pendulum is suspended on a fine wire, the support of the wire being constructed with great accuracy, so as not to interfere with the vibrations. The motion of the pendulum must be strictly confined to one plane; and, for that reason, in setting it to vibrate the bob is drawn aside and fastened by a silk thread and when everything has come perfectly to rest the bob is released by burning the silk thread. During its subsequent motion it is protected from currents of air by glass screens. It need scarcely be remarked, however, that this experiment is nothing more than an illustration. Our knowledge of the rotation of the earth, drawn from astronomical considerations, cannot be strengthened by it. This experiment was first made public in 1851, when it was exhibited by M. Foucault before the French Academy.

FOUCHÉ, foo-shā, **Joseph,** Duke of Otranto, French politician and detective: b. Nantes, 21 May 1759; d. Trieste, 25 Dec. 1820. The Revolution, into which he entered with enthusiasm, found him teaching philosophy in Nantes; he became advocate and was sent to the convention by the department of Loire-Inférieure. Here he was placed on the Committee for Public Eduction, voted for the death of the king and was implicated, at least nominally, in the atrocities of the period. In 1793 he was sent to the department of Nièvre to take vengeance on such persons as had incurred suspicion, which he carried through with vigor. In 1794 he incurred the hatred of Robespierre, and thus had a strong stimulus to assist in his downfall. In August 1795, he was expelled from the convention and kept a prisoner till the amnesty in October. In 1796 he communicated important information to the director Barras as to the designs of Babeuf and was rewarded in 1798 by being sent to Milan as Ambassador to the Cisalpine Republic. Here he labored with General Brune to establish a second 18th Fructidor; both were in consequence recalled. He appeared in Paris in 1799, after Barras had gained the ascendency, and was appointed Ambassador to Holland. Shortly after Fouché was recalled and named Minister of Police. This post he held, with intervals, until 1815. Here he first had full opportunity to display his great talents and exercise an important influence on the internal policy of France. His elaborate system of espionage gave him great power and proved at times almost intolerable to Napoleon, who dismissed him in 1802, and rewarded him with a senatorship; but he was recalled. After the battle of Waterloo, Fouché urged Napoleon's second abdication and advised him to seek an asylum in the United States. He placed himself at the head of the provisional government, negotiated the capitulation of Paris, obtained the removal of the army behind the Loire and thus prevented useless bloodshed. Louis XVIII made him again Minister of Police; and he labored so zealously in favor of moderate measures as to incur the hatred of all the ultra-royalists. He therefore resigned his office in 1815 and went as French Ambassador to Dresden. As he was struck at by the decree issued in 1816 against the murderers of the king, he sought an asylum in Prague. He afterward went first to Lintz, and then to Trieste.

Adroit, skilful, politic and unscrupulous, a Jacobin and the persecutor of Jacobins, Republican, Bonapartist or Royalist as the occasion demanded, Fouché loved intrigue for its own sake; from first to last he fought for his own hand and was carried through all the dramatic and startling changes of the stirring times in which he lived without hurt to his own person by sagaciously preparing a line of retreat for himself under all eventualities and by an instinct of self-preservation that amounted almost to genius. The volumes of memoirs published posthumously under his name have been pronounced forgeries by his family. Consult Martel, 'Etudes révolutionnaires: Etude sur Fouché' (1819); and his life by Madelin (2 vols., Paris 1901).

FOUCHER, foo-shā, **Jean,** early explorer and colonizer in South America: b. Cambrai, Flanders, 1508; d. 1567. He was with Sebastian Cabot at the discovery of the Paraguay River, in 1534 shipped as pilot to Mendoza's expedition to Paraguay, led an exploring party to the foothills of the Peruvian Cordilleras, and was a counsellor of Cabeza de Vaca (q.v.), with whom he was sent prisoner to Spain. Having received pardon he was appointed governor of Entre Rios, where he maintained a friendly attitude toward the natives and made further explorations.

FOUCHET, foo-shā, **Jean Antoine Joseph,** Baron, French diplomatist: b. Saint Quentin, France, 1763. The date of his death is not known. He was a law student in Paris when the Revolution broke out and published a pamphlet in defense of its principles. Soon afterward he was appointed a member of the executive council of the Revolutionary government, and was French Minister to the United States in 1794–95. Subsequently under Bonaparte he was prefect of Var and, in 1805, of Ain. On Napoleon's return from Elba he was made prefect of the Gironde.

FOUCQUET, foo-kā, **Jean,** French painter: b. Tours about 1415; d. Paris about 1485. He received his early artistic training in Italy, where he painted a portrait of Pope Eugenius IV, and later entered the service of Louis XI of France. For the king he executed several portraits. His best work consists of 40 miniatures in a prayer-book for Etienne Chevalier. Only in comparatively recent times has he been recognized as a founder of the French school.

FOUGÉRES, foo-zhār', France, town and capital of an arrondissement in the department of Ille-et-Vilaine, 25 miles northeast of Rennes, on the Nañçon River. It contains many interesting remains of mediæval times, particularly an ancient castle and the churches of Saint Léonard and Saint Sulpice. It is the chief industrial town of the department, being a centre for the manufacture of boots and shoes, leather, sail-cloth, dairy products. Nearby is a great forest with prehistoric megalithic and Celtic remains. Pop. 13,753.

FOUILLEE, foo-yā', **Alfred Jules Emile,** French philosopher and sociologist: b. La Poureze, department of Maine-et-Loire, 18 Oct. 1838; d. Lyons, 16 July 1912. He was to all intents and purposes self-educated, as he never had attended a university. From 1864 to 1868 he taught in obscure provincial schools, and in 1869 received an appointment at the Bordeaux Lycee. Here he founded his reputation as a teacher of philosophy. In 1872 he was appointed to the chair of philosophy at the Ecole Normale Superieure at Paris. His eyes and health failed him in 1875 and he gave up teaching for writing. He wrote several works on philosophy in the narrower sense on Socrates, Plato, on the problem of free-will and determinism, between which he tried to mediate, on idealism, positivism, anti-intellectualism, Nietzsche and Kant. One of his best-known books is his 'Critique des systemes de morale contemporains.' The tendency to apportion praise and blame with judicial fairness is everywhere apparent and his philosophy consequently assumes the character of a mediation between opposing opinions. These tendencies find their counterpart in his sociological investigations, for which he is most famous. In 'La science sociale contemporaine' he combines the ideas of the social organism and the social contract and accepts the organic theory of social genesis, the contractual theory of social rights and wrongs. In 'Lidee du droit' he synthetizes the views of the basis of law as farce, as equity and as utility. An analogous weighing of antithetic claims characterizes 'La propriete sociale et la democratie.' In 'Le socialism et la socialogie reformiste' he combines a strongly democratic tendency with an opposition to revolutionary methods. He was the author of several psychological works, in which he lay great stress on the notion of ideas as agents in evolution. He was a member of the Institute de France and of numerous foreign academies. At one time he was president of the Institute International de Sociologie. His wife, formerly Madame Guyot, was active in educational matters and was the author of 'La tour de la France par deux enfants,' under the pseudonym of G. Bruno. Consult 'La Philosophie et la sociologie d'Alfred Fouillee,' by his stepson, J. M. Guyan, and Worms, Rene, "Alfred Fouillee" (in the 'Ardio fur Geschichte der Philosophie,' Vol. XXVI, N. S. Vol. XIX, Berlin 1913).

FOUL BROOD. See BEE-KEEPING, *Diseases of Bees.*

FOULA (foo'la) **ISLAND,** the most westerly of the Shetland group, lying 16 miles southwest of the nearest point of mainland. It is a little over three miles in length and is two and one-half miles in breadth.

FOULD, fool, **Achille,** French financier: b. Paris, 17 Nov. 1800; d. Tarbes, 5 Oct. 1867. The son of a banker, he entered the financial field and succeeded his father in the latter's banking business. In 1842 he entered the political arena, being elected to the Chamber in that year. He acquiesced in the Revolution of 1848 and his knowledge of financial matters was of supreme importance to the provisional government. He opposed the use of paper money and to this end published the pamphlets 'Pas d'Assignats!' and 'Observations sur la question financière.' He was four times Minister of Finance under Louis Napoleon. In 1852 he resigned this office in consequence of the confiscation of the property of the Orleans family. He was appointed senator and soon became Minister of State and of the Imperial Household. He resigned in 1860 but was recalled to the Ministry of Finance in 1861.

FOULIS, fowlz, **Robert** and **Andrew,** eminent Scottish printers and publishers: b. Glasgow, the former in 1707; d. 2 June 1776; the latter b. 1712; d. 18 Sept. 1775. In 1741 Robert commenced business in Glasgow as a bookseller; and in 1741, having obtained the appointment of printer to the university, began in that capacity to issue editions of the ancient classics, which have made his press famous, both from the beauty of their type and their accuracy. For 30 years they issued the most accurate editions of the classics, in English, French, Italian, Latin and Greek. Their edition of Horace stands pre-eminent, and is hence known by the name of the "Immaculate" edition. In their later years they promoted an academy of painting and sculpture in which their fortune was lost.

FOULKE, William Dudley, American author: b. New York, 20 Nov. 1848. He was graduated at Columbia in 1869, at the Law School of the university in 1871, practised law in New York, removed to Indiana in 1876, where he was for 15 years an attorney of the Pittsburgh, Cincinnati and Saint Louis Railroad, and for one year (1883), editor of the *Palladium* and afterward of the *Evening Item.* He became a member of the State senate (1882–86). In 1889–90 as chairman of a special committee of the National Civil Service Reform League, he made important investigations in connection with the United States civil service. In 1893 he was chairman of the Suffrage Congress at the World's Columbian Exposition. He was United States Civil Service Commissioner in 1901–03 and president of the National Municipal League from 1910 to 1913. His publications are 'Slav or Saxon' (1887); 'Life of O. P. Morton' (1899); 'Maya: A Tale of Yucatan' (1900); 'Protean Papers' (1903); a translation of 'History of the Langobards by Paul the Deacon' (1906); 'Dorothy Day' (1911); 'Maya: A Dramatic Poem' (1911); 'Some Love Songs of Petrarch' (1915).

FOULQUES, foolk, or **FULCO OF NEUILLY,** the preacher of the Fourth Crusade who flourished in the 12th century. He studied in Paris and there became celebrated as a pulpit orator. He wandered throughout the country, preaching and exhorting the populace to amend their ways. In 1198 he began to preach the Crusade and in three years he claimed to have influenced 200,000 to undertake it. He did not live to see the result for he expired at Neuilly early in 1202. Consult Villehardouin, 'La conquête de Constantinople' (Paris 1874).

FOUNDATION. The term designates either the lower courts of a masonry structure, or a specially prepared surface or bed in contact with the soil or bed-rock upon which a building or other weighty structure of any kind is to be built. In practice there are many cases, however, in which the bed and the lower courses of the masonry structure jointly comprise the foundation proper, and render difficult or unnecessary the drawing of any marked distinction between them. The earlier Romans erected their buildings on the most solid foundations constructed of large blocks of concrete, composed of quarry rubbish, gravel or burnt earth, bonded by an excellent mortar. This material formed under the superstructures homogeneous basements of veritable artificial rocks capable of sustaining the heaviest of buildings without rupture or settlement. During the later Roman period, however, the foundations were much neglected, so that the architects of the 12th century afforded many examples of important edifices fallen on account of bad foundations.

The architectural and engineering works of to-day have passed from the types of comparatively light superstructures to those of mammoth size and enormous weight, requiring the strongest and most permanent foundations that modern engineering skill is capable of designing, and the application of reinforced concrete or concrete steel methods to the construction of practically all classes of foundations appears to represent the best practice of modern times.

The employment of a particular type of foundations depends upon the character of the soil and the presence of water, and the widely varying conditions met with in practice have developed several classes of foundation structures which may be briefly designated as peat foundations, sand foundations, hard soil foundations, pile foundations, etc.

Foundation Soils.— These vary in character from hard and solid bed-rock, hard-pan, and firm sand to liquid mud, quicksand and silt. It is clear that hard bed-rock, hard-pan, firm sand and various kinds of compact clays are the best materials to sustain foundation structures; but practical experience has very satisfactorily demonstrated that almost every substance in nature is capable of supporting the weight of other substance, no matter how small the sustaining capacity of that material may be, provided the weight to be sustained is distributed over a sufficiently large area, and provided the conditions of the soil are permanent.

The sustaining power of soils depends upon their composition, the amount of water which they contain or which may drain through them and the degree to which they are confined. Sound hard bed-rock of ledge formation will support loads up to 36 tons per square foot, but if the rock is seamy, rotten or in slippery inclined layers its sustaining capacity will be materially less. In general, the latest practice assumes the following safe allowable pressures: For hard-pan, eight tons per square foot; compact sand and clean gravel free from lateral movement, five tons per square foot; dry clay, three tone per square foot; and loam, one ton per square foot. Soft, watery clays, mud, quicksand and silt have very little or no sustaining power, and have to be penetrated until firmer material is reached and require to be compacted by draining, or consolidated by other means. If piles are employed, and they are driven to bed-rock or to refusal, the sustaining power is determined by the crushing strength of the material of the pile — timber, iron or concrete, as the case may be.

Peat Soil Foundations.— In soils such as peat, it is almost impossible to carry the walls down to a sufficient depth to reach a solid base. In such cases one of three methods has to be adopted — laying a strong concrete floor spread over a sufficient area; planting masses of iron or brickwork; or driving of piles. If a concrete floor is employed, it may cover the entire surface to be occupied by the building, and even extend to some distance beyond the footings of the walls in order to prevent cracks and settlements. These injuries are usually caused by heavy walls being placed too close to the edge of the concrete floor, causing it to buckle and crack, and to settle irregularly under the unequal weights of walls of different thickness. This condition is somewhat obviated under the French system by forming a lip under the edge of the concrete floor, converting it into a kind of inverted tray which confines the substratum within its limits.

Sand Soil Foundations.— In hard stable sand or gravel, or in compact dry clay above water level, the construction of strong, permanent foundations require comparatively simple methods. If the location is in cold countries, the preliminary excavation is carried well below the frost line, and the bottom is carefully leveled off to receive the concrete bed, or the broad footing formed by the lower courses of the masonry.

In the case of compressible soils, artificial means in the form of piles or of beds of concrete are first employed, and upon the platforms thus obtained the foundation proper is constructed. If foundations have to be constructed upon running sand, a satisfactory method is to make a good concrete floor the entire width of the trench, putting it in quickly, sealing up the sides and then pumping out the water when it reaches the level of the top of the concrete.

Clay Soil Foundations.— The construction of foundations in dry clay calls for the application of the simplest methods; but, in clay strata impermeated with water, and having a tendency to slide, especially in the case of hillside excavations, the problem is difficult and complex. As a rule, such soils do not slide piecemeal, but, where they do move, will slide as a mass with an almost irresistible energy capable of rupturing the strongest timbers as if they were toothpicks. The only way to proceed in such cases is to disturb as small a section as possible at a time so that any forward impulse may not be communicated to the entire mass, and to provide strong cross walls in the basement to act as buttresses. The foundations should be carried down to or below the ultimate drainage level so as to prevent shrinkage by any subsequent draining of the subsoil.

Pile Foundations.— These consist of groups of piles of timber, iron or concrete, plain or reinforced, sunk into the substrata and capped with platforms of timber or concrete upon which the superstructure is finally built.

Timber piles are tree trunks of varying diameter and length, with the bark removed and the knots and lateral branch stems cut off. Iron piles are of two kinds: the screw pile, consisting of a shaft of iron or wood, equipped at the foot with an iron casting in the form of two screw blades ranging in size from one to five feet in diameter; and the disc piles, consisting of hollow tubes carrying discs at their lower ends instead of screw blades. Concrete piles consist of tapering cylinders of concrete formed in place, and of columns of reinforced concrete of rectangular cross-section made above ground and subsequently driven into place by means of a pile-driver.

Various methods are employed to sink or drive piles into place. Timber piles are driven by the use of hammers which are raised and dropped by some form of engine. They have also been sunk by the aid of jets of water under pressure, as suggested by Sir James Brunlees as early as 1850, and first employed by him in connection with the sinking of iron piles in the construction of the foundations to carry a railway across the treacherous sands of Morecambe Bay. Some of the most notable deep pile foundations constructed by the driving method are found in Chicago, where the soil is soft, as those under the Public Library building, and the Illinois Central Railway passenger station. The latter is a structure 180 by 220 feet in plan, 9 stories high, with a tower of 13 stories and a station 3 stories high connected with a train shed 680 feet long. Borings taken on the site showed the substrata to consist of 10 to 20 feet of rubbish accumulated by dumping, and below that, several irregular layers of stiff blue clay and quicksand down to bed-rock, more than 60 feet below the surface. These conditions led to the adoption of a deep pile foundation, and about 1,700 piles, arranged in groups or clusters, were driven under the columns. These piles ranged in size from 40 to 60 feet in length, and from 11 to 16 inches in diameter at the butt. Thirty-two per cent were black gum, 22 per cent pine, 21 per cent oak, 7 per cent basswood, and 15 per cent hickory, with a few maple and elm. They were driven with drop hammers weighing 2,800, 3,200, and 3,800 pounds respectively, the fall ranging from 35 to 50 feet. A cast-iron cap was fitted over the heads of the piles to prevent them from being crushed or split, but in spite of this protection over 8 per cent of the heads suffered serious injuries of that character. The piles were all driven in groups until the tops of all were below the leads, then the driving was completed by the use of a follower. Water was kept running continuously around the pile at the surface during the driving operations and was found to materially aid in the sinking of the piles. After the piles had been driven home, the tops were sawed off to a uniform height of three feet below datum, thus placing all the timber below low water level. As this was at least 10 feet below the surface, the trenches had to be sheathed, and were kept drained by continual pumping. The earth was excavated to the depth of 18 inches below the top of the piles and carefully mixed concrete was tamped in flush with the tops. Finally, oak caps 12 inches square were drift-bolted to the centre of each pile, and the space between the timbers was filled with concrete.

When piles are sunk with the aid of jets of water, the work is accomplished much more simply and rapidly than by driving. A pipe two or three inches in diameter is attached to the side of the pile and connected to a pump. The pile is first covered with pitch and then the water is forced through the pipe under the bottom of the pile, so that the sand is converted to a degree of fluidity that allows the pile to descend rapidly to the desired depth. When one pile has been put down home, the feed pipe is detached and spiked onto another and the operation is repeated. The accuracy and certainty of this method is so great, that it is a common practice to make the holes for the bolts in the piles before they are brought into position. After the pile is down and a reasonable length of time has been allowed for the churned up sand to subside, it recovers its solidity and grips the pile so tightly, that it is almost impossible to start it again.

When hollow iron piles are used, the water is conveyed through the centre of the tube under hydraulic pressure, disturbing the sand under the piles and allowing them to sink by their own weight to the proper depth. Upon withdrawing the pressure and stopping the flow of water, the sand returns to its former consistency and holds the pile stationary.

Concrete piles have been used during a comparatively recent period, but their success has been so great that their development in the future promises to bring them into general use in the place of timber and iron piles. These piles, as previously mentioned, are either formed in place, or they are molded above ground. A great many methods have been suggested for forming the hole to contain the concrete when the pile is formed in place. One method consists in driving a double shell of metal into the ground and then withdrawing the inner shell, leaving the outer shell as a mold for the concrete. Another method, shown by Fig. 1, employs a single shell equipped with a concrete or a steel point. The shell is first driven to the desired depth and then withdrawn slowly and the space it occupied filled with concrete, the surface being kept at a sufficient depth below the end of the tube to maintain the head required to resist the pressure of the ground. Concrete piles used for under-pinning are sometimes sunk with the aid of the water jet to a depth sufficient to reach firm strata and the bottom of the excavation is enlarged by means of a spiral expanding device so as to form a base, as shown in Fig. 2.

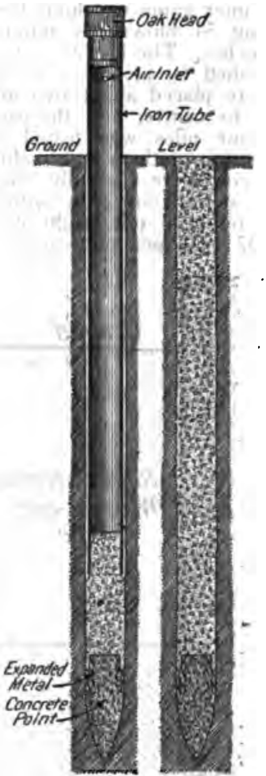


FIG. 1.

Piles made in place may be reinforced, if desired, but usually reinforced concrete piles are formed above ground. They are designed like columns, the reinforcement consisting of vertical bars of steel connected at intervals with horizontal wire rods or plates. They are made usually in square and triangular cross-section, circular molding being too expensive and the arrangement of the required reinforcement being too complex. The general character of these piles is illustrated by Fig. 3.

The supporting power of piles depends upon their action as a column resting on a hard base, or upon the friction against their sides developed by the gripping action of the material through which they have been driven. Very often the supporting power is a combination of both actions. The amount of this power may be calculated in various ways, but at their best the results are of necessity only approximations. The supporting power of a pile driven to bed-rock is determined by the crushing strength of the material of which it consists, but it it is supported wholly or in part by side friction, as is almost always the case, its supporting power is calculated by a formula based upon factors obtained by experiment, or upon the distance penetrated by the pile under the blow of the driving hammer.

The construction of the pile foundations for the Chicago Public Library building afforded valuable information relative to the supporting power of piles as determined under actual conditions. Piles of Norway pine were driven with a steam hammer having a total weight of 8,300 pounds, the hammer alone weighing 4,500 pounds and delivering 54 blows per minute, with a stroke of 42 inches. The last 20 feet of driving was accomplished by means of a follower. The piles were placed about two and one-half feet centre to centre, and the supporting power of four piles was tested by building a platform on top of them and loading it with pig-iron. Levels were carefully taken on each pile. They stood four days with a loading of six tons on each pile, eight days with a loading of 37 tons per pile, and 10 days with a load of 50 tons per pile. The The settlement did not exceed 0.01 of a foot. These tests indicate that if 250 pounds per square inch be assumed for point resistance, the average frictional resistance will amount to about 3.2 pounds per square inch of side surface of pile, or about 432 pounds per square foot. In the case of an ordinary pile, seven inches through the top and 14 inches at the butt, driven in a fairly solid soil, the point of resistance might be 6,000 pounds and the frictional resistance 59,000 pounds, a total earth resistance of 65,000 pounds, equivalent to the supporting power of the pile considered as a column and allowing a safe support for 25,000 pounds.

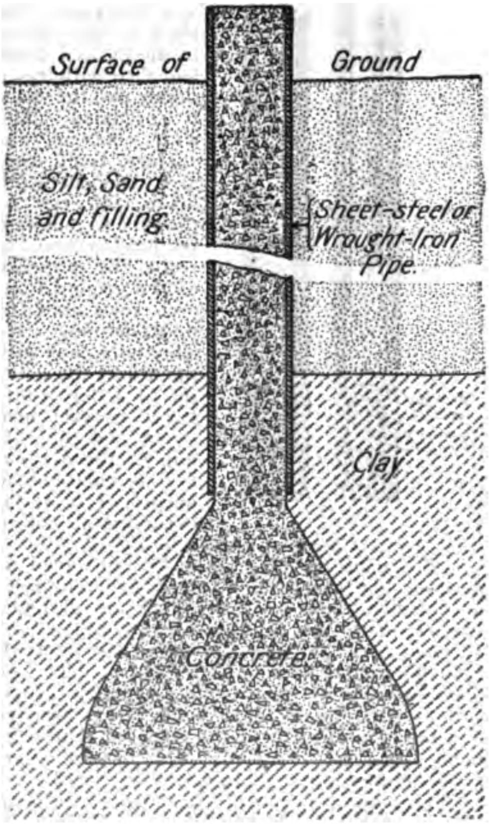


Fig. 2.

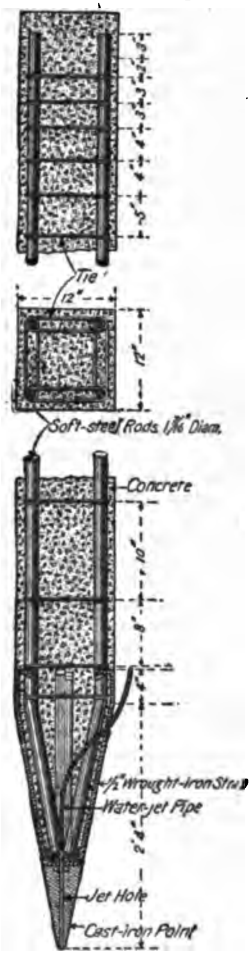


Fig. 3.

Usually, the determination of the point at which a pile is considered as having been driven to a firm bearing depends greatly upon the judgment of the engineer in charge, based upon his experience in the particular locality in which the work is being performed. The best practice, however, affords the following safe specifications of allowable penetration. For piles meeting a hard resistance a penetration of one inch under each blow of a 2,000-pound hammer falling 10 feet, and a penetration of two inches under the blows of a 2,000-pound hammer falling 15 feet. The minimum distance between centres depends upon the hardness of the sub-strata, the size of the butts and the weight to be carried. Spruce piles may be often driven 24 inches between centres, while large and long piles need not usually be driven closer than 30 inches between centres. Another factor that must be carefully considered is the supporting power of the soil as a whole. For example, if that power is equal to two tons per square foot and each pile is capable of sustaining 18 tons, it is useless to place the piles closer than three feet between centres.

In connection with the use of timber piles in places where the durability of the timber is very liable to be seriously impaired by the attacks of the Teredo worm, the latest practice appears to favor the system of armoring them with concrete. In such cases the timber piles are usually driven in sets of three to a firm bearing. They are then cut off, one two feet, one four feet and one eight feet, below the level of the wharf platform. A wooden stave cylinder of three-inch planking is then placed around the piles and driven into the mud to a depth of perhaps 12 feet, and the bottom of the cylinder sealed. The contained water is then pumped out and a cylinder of expanded metal is set within the wooden cylinder, and the remaining space filled with concrete.

Another method still more recently introduced consists in the use of terra-cotta pipes as an outer covering for the piles. In this case the armoring is limited to individual piles.

"Skyscraper" Foundations.— In the construction of the tall steel and concrete buildings commonly called "skyscrapers," which are so common in Manhattan, N. Y., the usual plan is to excavate the foundations 30 to 50 feet, and then to sink steel caissons as may be necessary to permit concrete piers to go to bedrock. The size and number of these piers is determined by the weight of the superstructure. If it is not possible to spread the foundations beyond the line of the walls, steel trusses are placed at the footings of the walls to transfer the weight to the centre of the piers, distributing it uniformly. It is common to cap the piers with large blocks of granite or stout iron castings. The foundations of one of these tall buildings, when nearing completion, presents the appearance of a group of concrete piers rising from the soil to the level of the cellar. A great deal of ingenuity is required to sink deep foundations in a large city without disturbing the support of adjacent buildings.

Platform Foundations.— These structures are designed to distribute a concentrated weight over a large area in soft substrata when piles are not employed. They may consist of beds of concrete, or of masonry or brick inverted arches sprung between supporting piers or columns, as shown by Fig. 4. They may also consist of platforms of timber grillage — timbers placed across each other in alternate layers, or of platforms of concrete or masonry reinforced with a grillage of steel bars, as illustrated by Fig. 5, which shows the platform foundations of a World's Fair building in Chicago, consisting of a concrete bed reinforced with a steel rail and I-beam grillage, to support the base castings of the main columns.

Subaqueous Foundations are those constructed in the substrata of river beds or other bodies of water, or where the existing conditions necessitate the building of structures in water and below the level of its surface. This class of work is accomplished by the use of cofferdams, cribs and open caissons, pneumatic caissons, by dredging through wells, by forcing cement into the substrata under pneumatic pressure, and by by freezing the substrata.

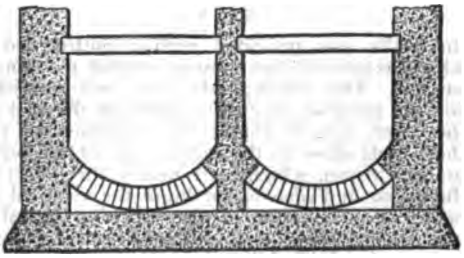
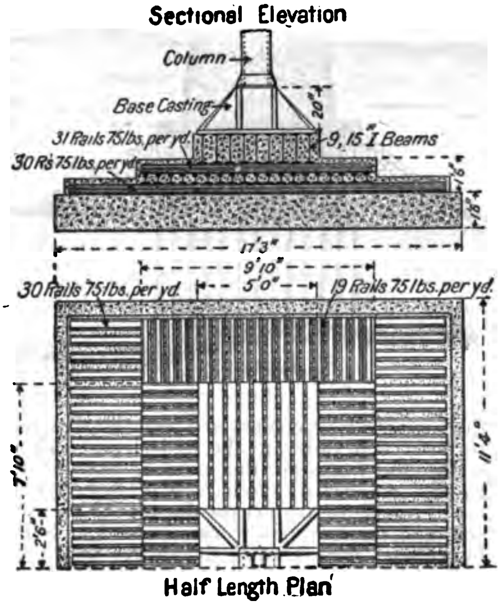


Fig. 4.

Cofferdam Method.— The use of cofferdams is limited to the construction of foundations in shallow waters where the depth of the necessary excavation to reach a firm bearing is small, or in water-bearing substrata on land. They are usually constructed by driving a double row of sheet piles — heavy timber or steel planking — around the area in which the foundation is to be built. The space between the piles is then tamped in solidly with clay, and the water pumped out of the enclosure, so that the work of excavating and the subsequent masonry construction may be carried on in the open air. Cofferdams are sometimes constructed of walls composed of bags of clay piled around the foundation area, and reinforced with barrels of sand banked on the outer side of the walls.



Sectional Elevation

Half Length Plan

Fig. 5.

Crib and Open Caisson Method.— Under this method, the foundation bed is first prepared by dredging until a solid material is reached, or by driving piles to a sufficient depth to reach a firm bearing. When piles are employed they are cut off at a uniform depth below the level of the water surface and constitute the supporting bed of the caisson. The caisson consists of a water-tight box-like structure open at the top. It is floated over the position of the bed, previously prepared by dredging, and the masonry work built up in its interior until it gradually sinks and rests upon the bed. The side walls are then removed, leaving the bottom of the structure — the crib — in the foundation between the masonry and the supporting bed. Fig. 6 illustrates the foundation for a pier constructed by this method, the rib being supported by piles.

Pneumatic Caisson Method.— In this method two water-tight box-like structures built of timber or of metal are used. They are connected together one above the other, the lower caisson being inverted, and the upper one open at the top. This structure is floated and anchored over the position selected for the pier and the masonry built inside the upper caisson until the lower edge of the lower caisson rests on the bed of the body of water. The contained water in the lower caisson is then expelled by compressed air, allowing men to enter and excavate the underlying material within the limits of the caisson. As the excavated material is discharged by being passed out through an air-lock in the top of the caisson, and the masonry work is added to course by course, thus keeping it always above the surface of the water, the caisson sinks lower and lowered into the substrata until it reaches solid rock or other firm material. The lower caisson is then filled with concrete, and the sides of the upper caisson are removed, leaving the masonry on the foundation formed by the lower caisson with its concrete filling. Fig. 7 shows the longitudinal section of a caisson of this type.

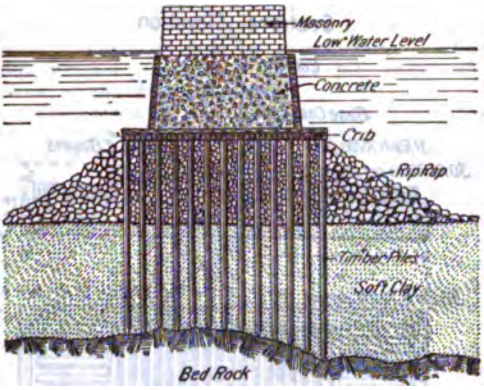


FIG. 6.

The pneumatic method, although one of the most effective, is limited in its application to work at a depth of about 100 feet below the surface of the water, as it is impossible for men to work conveniently and effectively under a greater air pressure than that required to sustain a column of water of that height.

A clear idea of the application of the pneumatic caisson method to works of great magnitude may be obtained from a description of the caissons used in constructing the foundations for the piers of the Williamsburg suspension bridge, completed between Manhattan and Brooklyn, N. Y., in 1904.

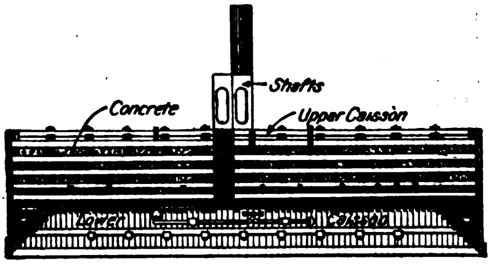


FIG. 7.

The following description is that of the north caisson of the New York tower, pictured as Fig. 8, but it also applies in almost every particular to the other three. The river bed consisted principally of sand, and some clay and boulders. Below this, at a depth varying from 45 to 75 feet below high water level, the formation consisted of gneiss rock with a very irregular surface. The caisson was sunk through the sand, clay and boulders until it rested on the rock, which was then blasted away and stepped so as to make a fair bearing for the edge on all sides. The caisson measured 60 feet by 76 feet on the sides, with a total depth of 19 feet, and a working chamber 7½ feet in height. The walls were 2 feet 9 inches thick and were built of two courses of 12 by 12-inch timbers, the outer course placed longitudinally and the inner vertically. Two layers of 3-inch planking were placed on the outside, and one layer on the inside. The bottom of the walls was provided with a cutting edge, which extended continuously around the whole caisson. This cutting edge was not provided for the purpose of cutting through the bed of the river, but to enable the workmen to use their tools close to the outer edge of the walls of the caisson, which were nearly three feet in thickness, and also to facilitate the removal of boulders. The roof of the working chamber was 5 feet in thickness, and consisted of several layers of 12 by 12-inch timbers. The whole caisson was stiffened with massive steel-plate riveted-trusses, which extended across from wall to wall. All the timbers of the caisson and of the roof were drift-bolted together so as to give great rigidity to the structure, and to make it water-tight. Additional strength was given to the working chamber by two solid

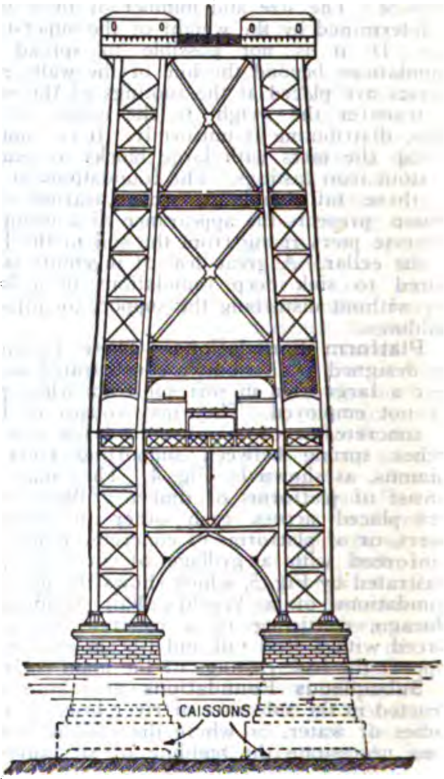


FIG. 8.

bulkheads, which extended entirely across and divided it into three compartments, openings being provided for the passage of workmen. A massive framework or gridiron formed of 16 by 16-inch timbers was bolted together and to the side walls at the level of the lowermost timbers with 1½-inch steel tie-rods. From each intersection of this framework vertical posts reached to the roof and were tied together and stiffened to resist lateral distortion, by diagonal struts and tie-rods, as shown in Fig. 9, practically forming two steel trusses 9 feet 3 inches in depth, with a weight of 10 tons each. They were a novel feature in this class of work, but were rendered necessary on account of the shallowness of the caisson. The roof was pierced with 7 shafts, each about 3 feet in diameter, for the passage of men and material, and several pipes ranging from 1 to 5 inches in diameter, for supplying air and water, blowing-out sand, and for carrying electric light wires. These shafts were of circular section, and were put in place in lengths of 8 feet as the masonry work was carried upward.

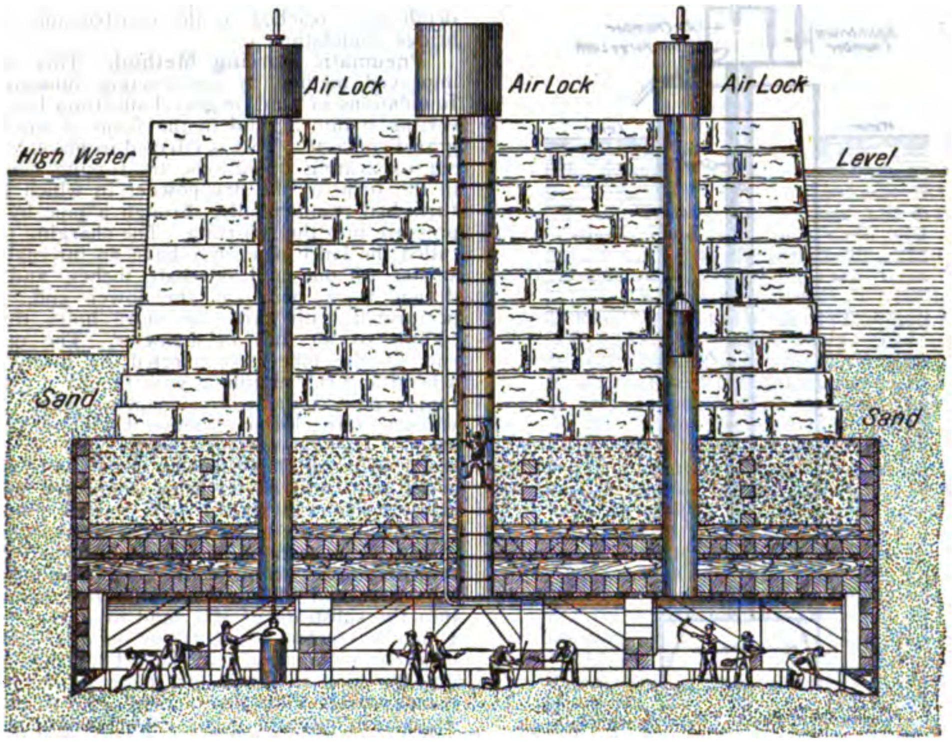


FIG. 9.

The piers on the Brooklyn side were constructed in a similar manner, with the exception that they were carried to a depth of 107 feet below high water. The last caisson to be sunk passed through 50 feet of water, 20 feet of sand, gravel and boulders, 30 feet of hard clay and hard-pan, and 12 feet of rock. The excavating of the rock was rendered necessary by the steepness of its slope.

The lower caisson measured 63 feet by 79 feet, and contained 74,700 cubic feet of timber, and 98 tons of iron, the greater portion of which was in the form of drift-bolts. Without the concrete filling it weighed 1,965 tons, and contained 6,000 yards of concrete above the roof of the working chamber. The upper caisson was 50 feet deep and contained 29,000 cubic feet of timber and 32 tons of iron.

The sinking and concreting was accomplished in three months and six days. Down to the depth of 55 feet the men worked in eight-hour shifts. Below this depth the shifts were successively shortened as greater depths were attained. Although the air pressure at the depth of 107 feet was 46 pounds per square inch, there was very little sickness among the workmen.

Other notable examples of the pneumatic caisson method are the foundations of the centre pier of the Harlem River bridge, New York city; the Benares bridge over the Ganges River, India; the Poughkeepsie bridge over the Hudson River, New York; the Hawkesbury bridge, New South Wales, Australia; and the Jubilee bridge over the Hooghly River in Bengal. The centre pier of the Harlem River bridge supports the thrust of a 510-foot steel arch on each side of it, and stands on a timber caisson 54 feet by 104 feet, with a depth of 13 feet. It is divided into three compartments by vertical partitions which not only serve to strengthen the caisson, but protected the men during the blasting operations necessitated by the greatly inclined surface of the rock.

Foundations for piers or abutments of bridges or for the main columns of high buildings, where the individual piece of work is of lesser magnitude than those already cited, are usually constructed by the use of cylinders of iron as illustrated by Fig. 10. The arrangement consists of a cylinder of metal divided into two unequal parts bv a horizontal partition — the upper and larger part, essentially a cofferdam, being the caisson proper, and the lower part within which the excavating operations are carried on being the working chamber. It is provided with one or two shafts made of boiler-plate, which are connected with the air chamber on top adjoining the equilibrium chamber or air-lock through which the workmen and materials must enter. A pipe from the air compressor furnishes the air chamber with compressed air which is subsequently introduced by a system of locks to the working chamber below.

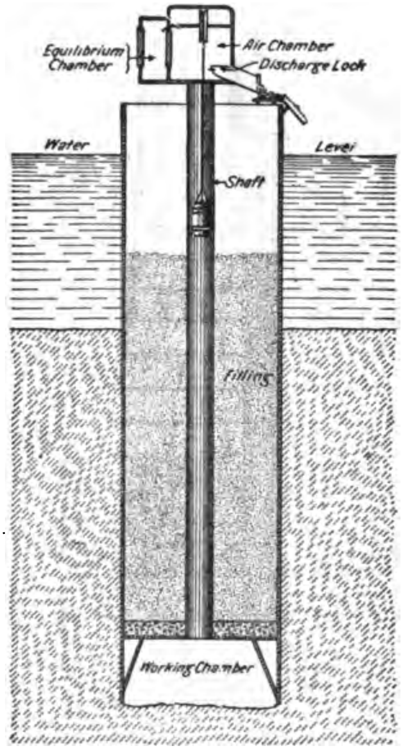


FIG. 10.

Dredging in Wells.— Beyond the limit of the effective application of pneumatic methods, about 100 feet below the water surface, all excavating must be accomplished by dredging, and special care has to be exercised in planning the method of operations to prevent any contingency arising at the bottom that would require to be dealt with by the use of human labor, as diving operations are impossible. It is also important to observe that the skin friction, quite unimportant in a cylinder of moderate depth, becomes so great at lower levels that special means have to be employed to overcome it. In the Benares bridge the principal piers are sunk to the depth of 140 feet below the level of the water and consist of oval brick wells each 28 feet by 65 feet in diameter, the bottom lengths being cased in iron, as it was necessary to begin operations in the water. Each well is divided into three vertical compartments in which the dredging was carried on. In constructing the Poughkeepsie bridge, the caisson is of timber 60 × 160 with a depth of 125 feet. It is divided into 40 vertical cells and was sunk to a depth of 130 feet by filling in some of the cells and excavating in others. In the case of the Hawkesbury bridge, the caisson is of steel and iron, of oval form 20 × 48 feet, and splayed out at the bottom an additional two feet all around. It is divided into three dredging wells set on the centre line and parallel to its length. They splay out at the bottom so as to meet each other and the outer skin, thus forming a cutting edge. It was sunk to a depth of 161 feet below the water level by dredging in the wells, and then the space between the wells and the outer skin was filled with concrete. This is probably the greatest depth ever reached in the construction of a bridge foundation.

Pneumatic Forcing Method.— This is an improved method of constructing subaqueous foundations in sand or gravel substrata by converting it into a solid in the form of sand or gravel concrete. This is effected in place, without excavating operations, by forcing cement in the form of the dry powder in which it is furnished commercially, through a pipe by air pressure into the substrata. The charging pipe, called the lance pipe, may have an internal diameter of one and one-half inches, and be drawn to a point at the lower end, and perforated with three or more holes three-eighths of an inch in diameter. The upper end of the pipe is connected by means of a bend and rubber tubing with the air pressure supply pipe, suitable arrangements being provided to raise, lower or move it while in operation. The air pressure supply pipe is provided with suitable branches fitted with stop-cocks to permit of its being connected to an injector device by which any desired quantity of cement powder may be fed into the current of air. In operation, the air pressure forces the cement powder through the small openings at the lower end of the lance pipe and drives it into the substrata of wet sand or gravel, with which it combines and forms sand or gravel concrete as the case may be. The lance tube may be sunk to depths of 16 or 19 feet in a comparatively short time and in order to insure a uniform mixture in the foundation pit, the foundation area is divided into small fields 8 to 12 inches square, into each of which the proper quantity of cement is blown. The proper amount of the cement charge is determined by dividing the cubic contents of the field by the required proportion of the mixture. This method of converting a sand-bed into concrete was employed in the construction of the subway under Brooklyn, to prevent the undermining of some of the large and heavy buildings which were passed in tunneling.

Another method by which bodies of cement or concrete may be placed in quicksand substrata employs pipes in the following manner: Two or more iron pipes are sunk through the quicksands to the desired depth and water pumped into one of the pipes, thus converting the substrata into a condition of fluidity sufficient for the purpose of pumping it out through the other pipe. The cement is then introduced through the forcing pipe and filled into the agitated area at the bottom of the pipes.

Bibliography.— For further information consult Baker, 'A Treatise on Masonry Construction' (2d ed., New York 1906); Buell and Hall, 'Reinforced Concrete' (New York 1904); Fowler, 'The Cofferdam Process for Piers' (New York 1898); id., 'Practical Treatise on Sub-Aqueous Foundations' (3d ed., ib. 1914); Jacoby and Davis, 'Foundations of Bridges and Buildings' (ib. 1914); Kidder, 'Architects' and Builders' Pocket Book' (16th ed., ib. 1914); Patton, 'A Practical Treatise on Foundations' (New York 1893); Taylor and Thompson, 'Concrete, Plain and Reinforced' (New York 1905); and special articles on the subject in the various engineering magazines and periodicals.

FOUNDATION PRINCIPLES, Hooker's, the basic suggestions of Thomas Hooker (q.v.) in 1638, which, a year later formulated as Fundamental Orders (q.v.), created the Commonwealth of Connecticut.

FOUNDER, also called **LAMINITIS,** is a disease characterized by inflammation of the vascular sensitive laminæ of the horse's foot. Occasionally the laminæ are strained from severe exertion; more frequently they suffer from the morbid effects of cold, which is especially injurious after excitement and over-fatigue. The shoes should at once be removed, and the toes, if long, reduced, but no further rasping or cutting is permissible. The feet should be enveloped in hot bran poultices, and kept off the hard ground by a plentiful supply of short litter. Purgatives, if required, should be used with extreme caution. See HORSE, DISEASES AND CARE OF.

FOUNDERS AND PATRIOTS OF AMERICA, The, a society founded in 1896 and incorporated 18 March of the same year, the object stated in the articles of incorporation being "to bring together and associate congenial men whose ancestors struggled together for life and liberty, home and happiness, in the land when it was a new and unknown country, and whose line of descent from them comes through patriots who sustained the colonies in the struggle for independence in the Revolutionary War; to teach reverent regard for the names and history, character and perseverance, deeds and heroism of the founders of this country and their patriot descendants; to teach that the purpose of the founders could have had no lasting result but for their patriot sons; to inculcate patriotism; to discover, collect and preserve records, documents, manuscripts, monuments and history relating to the first colonists and their ancestors and their descendants, and to commemorate and celebrate events in the history of the colonies and the republic." The order admits to membership any male citizen of the United States above the age of 21 years who is lineally descended, in the male line of either parent, from an ancestor who settled in any of the colonies prior to 13 May 1657, and whose intermediate ancestors in the same line during the Revolutionary period adhered as patriots to the cause of the colonies. William Cary Sanger, of Sangerfield, N. Y., was governor-general of the society in 1917. There are State organizations in New York, Pennsylvania, Massachusetts, Illinois and New Jersey.

FOUNDING. The art of making molds in sand, loam or plaster of Paris, with or without the aid of patterns. The molds thus made are filled with molten metal which is subsequently allowed to cool and solidify into a metal casting corresponding to the form of the mold.

The various founding processes are characterized by the kinds of metal employed in the castings, such as iron, steel, brass, bronze, etc., and by the class of work produced, such as water pipes, car-wheels, ordnance, statues, bells, etc., involving the applications of special methods in the work of molding; in the melting of the metal; in the filling of the mold with the molten metal; and in the manner in which the metal is allowed to cool.

Molding in Sand.— The process of molding in sand by means of patterns embedded in flasks containing sand, is substantially as follows: The flasks, which are box-like arrangements provided with suitable handles by which they may be lifted and moved around, are generally used in pairs—the upper flask being commonly designated the "cope," and the lower one, the "drag" or "swivel." The patterns, usually of wood, are made either in one piece when the design of the casting is simple, or in several pieces when the form of the casting is more complicated. In molding, the drag is filled with sand and the pattern embedded in it. The cope is then placed over the drag and the sand rammed in tightly around the pattern. The pair of flasks is then turned over and the loose sand taken out of the drag and replaced by sand firmly rammed in its place. The flasks are now returned to their original position; the cope is taken off and the pattern removed. The cope is then replaced upon the drag, and the mold is thus made ready to receive its filling of molten metal. This is accomplished by pouring the metal through suitably formed gates or holes which extend through the cope and connect with the molded spaces in the drag.

The use of a separate appliance for a drag is very often dispensed with, the pattern being embedded in a bed of sand upon the foundry floor. This method is especially applicable when a large number of small castings are made at each pouring. Also, very often the patterns are made in two parts, that is, divided in the middle horizontally, so that one-half of the mold is made in the drag and the other half in the cope. In the case of hollow cylindrical castings such as water pipes and the tubes of heavy ordnance, a cylindrical core of the proper dimensions is suspended in the drag mold before the cope is placed in position, and the annular space between the core and the interior walls of the mold is filled in with the molten metal.

Molds are made either in green or in dry sand. Those in green sand are suitable for the making of small and simple castings; but molds in dry sand are employed in the production of castings of large size and great intricacy of design. In such cases, after the molds have been finished, they are placed in drying ovens until they are thoroughly dried.

Molding in Loam.— In this process, the molds instead of being made by the embedding of patterns in sand, are formed by means of cores of metal or of brickwork which are covered by several coatings of loam — mixed sand and clay, to correspond with the form and dimensions of the desired castings. An outer shell constructed around the core thus thickened, provides the annular space for the reception of the metal. The method is especially applicable to the founding of hollow cylinders, bells and statues. Consult Sharp, 'Modern Foundry Practice' (1900); Hall, 'The Steel Foundry' (1914). See Foundry and Forge Shop Terms.

FOUNDLING, a child abandoned by its parents, and found by strangers. Though infanticide was not punished among the ancient nations, with the exception of Egypt, where the child's corpse was fastened to the guilty parent's neck for three days and nights, yet natural feeling would prompt parents to expose their offspring, and leave their fate to accident rather than kill them. They usually selected places which were much frequented, where there was a greater chance of the child being saved. In Athens and Rome they were exposed in especially appointed places. In the 4th century under the Emperors Valentinian, Valerius and Gratian, the practice was prohibited. The bishop of Treves in the 6th century allowed foundlings to be placed in a marble basin in front of the cathedral, thus entrusting them to the care of the Church. In 787 a foundling hospital was established at Milan and in the same year the Council of Nicæa determined that each large city should maintain such an institution. Foundling hospitals were established at Montpellier in 1070; in Rome, 1212; in Paris, 1362; and in Vienna, 1380. Among the most famous of modern institutions is the foundling hospital in Paris formerly established in 1670. With the founding of the institution which it superseded Saint Vincent de Paul was closely identified. It receives not only foundlings strictly so called, that is, deserted children of unknown parentage, but also deserted children of known parents, and destitute children generally, as well as children pronounced incorrigible by the courts or declared to be so by their parents.

England has no foundling hospital properly so called; all exposed children are brought up at the expense of the parish in which they are found. The Foundling Hospital in London, established by Thomas Coram, a master-mariner, in 1739, was originally a hospital for exposed and deserted children. It for a time fulfilled the purposes intended by its founder, and it was repeatedly assisted by parliamentary grants; but the enormous increase of abandonments, and the expense which they occasioned, produced such an alteration in public sentiment that the hospital was changed to what it now is, a hospital for poor illegitimate first-born children whose mothers are known and of good character before conception. About 500 children are maintained till the age of 15.

Under the old Russian system foundlings were received at the church windows by a staff of women paid by the state; but they are now in the hands of the provincial officers of public charity. In Mexico, Rio de Janeiro and Buenos Aires there are large foundling hospitals. Similar institutions are maintained for destitute and abandoned children in China.

In the United States foundlings are usually consigned to the county poor farm, but foundling and maternity hospitals exist in the principal cities. Foundling hospitals are said to diminish not only the exposing of children, but also to render infanticide and intentional abortion less frequent. The objection that they contribute to the corruption of morals, if they receive children indiscriminately, and that they encourage parents to rid themselves of responsibility, is the strongest which can be urged against such institutions, and is not easily answered. In Massachusetts foundling hospitals are legally forbidden. In New York city foundlings are sent to Bellevue Hospital — where the finger-print method of identification has recently been adopted — and formerly were transferred to the Infants' Hospital on Randall's Island or in the borough of Brooklyn, to Flatbush. The rate of mortality among them was alarming; in 1897 all children received at the Randall Island institution died before reaching the age of two years, chiefly owing to the change of food and neglect before and exposure during abandonment. At baby farms, private institutions where babies were boarded for gain, the same conditions also prevailed. The attempt to remedy these deplorable conditions has in recent years met with great success. Foundlings of whose parentage nothing is known are baptized alternately Roman Catholic and Protestant, the Roman Catholic children being in charge of the Guild of the Infant Saviour, while the committee care for the Protestants. In connection with this admirable work is an agency for providing situations in the country for destitute mothers with infants. The *mothering* system has been long enforced in the Chicago Foundling Asylum, where the death rate is very low, and is being adopted in similar institutions throughout the States. A strong public sentiment has sprung up in favor of placing all dependent children in family homes as the normal environment in which children may best be reared, and against institutional treatment. Consult Folks, H., 'Care of Neglected and Dependent Children' (New York 1901); Gorst, 'Children of the Nation' (ib. 1907); Henderson, 'Dependents, Defectives and Delinquents' (Boston 1901); Hill, F. D., 'Children of the State' (2d ed., 1889).

FOUNDLING HOSPITAL or ASYLUM. See Foundling.

FOUNDRY AND FORGE SHOP TERMS. The following list of terms includes some of the most significant words and phrases commonly used in connection with foundry and forge shop operations:

Angles.— Strengthening pieces which are sometimes formed around the angular portions of castings.

Annealing.— The subjection of brittle and non-elastic metals to the action of long continued heat, which effects a rearrangement of the ultimate molecules, and makes the metal tougher or more homogeneous. Steel castings, old chains and rods, and other forms of hammered work, which have been used for a long time, may be improved by annealing; but, newly rolled plates and bars, the fibrous condition of which has not deteriorated, may be weakened in tensile strength by the process, though there may be gains in the removal of internal strains. Annealing is carried on by means of "annealing-ovens" into which the "annealing-pots" containing the articles which require to be annealed are run, and exposed to the action of the heat for periods ranging from several hours to several days as the circumstances may require. The function of the annealing-pots is the preservation of the contained articles from the action of the atmosphere during the process of annealing.

Bars.— The stays or bridges placed in molding boxes to support the sand which encloses the pattern. They are purposely cast as rough as possible in order to insure the adherence of the sand. Vertical or "cope-bars" have their edges kept about three-quarters of an inch away from the pattern and about the same distance from the joint of the box. "Flat-bars" or "drag-bars" are placed in the "drag" or bottom-half of the mold, and, therefore, do not follow the outline of the pattern.

Battering-off.— The finishing of the surfaces of forged work by hammering while the metal is dropping to a low red or black heat.

Bead Slickers or **Bead Tools.**— Slicking tools used by molders for smoothing the impressions of beaded work such as the ornamental fillet or strip curved around the edge of a casting.

Bedding-in.— A method of molding in which the pattern is embedded in sand on the foundry floor instead of being placed in a box mold and "rammed-up" with sand.

Binders.— Rosin, glue, wheat and rye flour, linseed oil, etc., employed for the purpose of giving strength to "core-mixtures."

Blackening.— Pulverized charcoal, coal, coke and plumbago or graphite used by molders for slicking over the surface of a mold in order to secure a smooth surface for the casting.

Black Wash.—A solution used on loam molds and dry-sand molds for the same purpose that blackening is used in green sand molds.

Blast.— A volume of air artificially forced into furnaces and forges by means of bellows, blowers and rotary fans, to accelerate the combustion.

Blowers.— Machines employed for the production of blast, ventilation, etc. The principal forms consist of blowing cylinders and pistons, and the rotary blowers or centrifugal fans which are operated by power-driven belting. A desirable blast for a foundry may range from four to six ounces, approximating to a pressure ranging from seven to ten inches as indicated by the water gauge, to higher pressures for ventilation.

Blowholes.— Hollow cavities in castings caused by the presence of bubbles of air or gas in the mold due to imperfect venting. When of a bluish color, they indicate the presence of sulphur in the metal.

Bottom Board.— The board on which the joint of a pattern is placed when it is being rammed-up, either to sustain a weak pattern, or to make the molders' "sand-joint."

Burning-off.— A process of drawing temper from a spring. The spring to be tempered is first hardened by immersion in linseed oil. When cold, it is taken out and the adhering film of oil ignited and allowed to burn off, thus producing a temperature of at least 600° Fahr., which draws the temper of the spring and coats it with a black surface that makes it practically rust proof.

Burning-on.— The replacing of a broken-off or incomplete portion of a casting. A mold of the portion which is to be burned-on is placed in the proper position against the main casting, and the molten metal poured in. The metal is allowed to flow over the broken face of the casting and out through a gate at the side of the mold, until the broken face is in a state of local fusion. The gate is then stopped, and the metal allowed to cool. Perfect amalgamation may be attained by the method.

Case Hardening.— The treatment by which wrought iron is hardened on the surface. It is first heated to a red heat in the presence of carbon, and absorbs enough of the carbon to transform it into steel on the outside. It is then chilled suddenly to harden the steel.

Chaplet.— A metallic device used for supporting the "core" of a mold. Chaplets are of various forms — the single-headed chaplets, the double-headed chaplets, the spring chaplets and the adjustable chaplets. They are placed under the cores to support them, or above the cores to hold them down, or at the sides of the cores to enable them to resist the lateral pressure exerted by the flowing metal.

Charging.— The supplying of furnaces with fuel and ore. In a reverberatory furnace, the "charging-door" or the opening through which the charge is introduced, is located at the side; while in a blast furnace or a cupola it is located at the top.

Chart Method.— A method for computing the weight required for holding down the cope and core against the raising effort of the head of flowing metal. It consists in drawing to scale the outline of the form and size of the lifting surface, and the height of the fluid head, and computing from the figure thus obtained, the cubical contents which multiplied by the decimal .26 gives the data for the necessary weight.

Chills.— Metallic molds into which specially mixed molten iron is poured for the production of chilled or surface hardened castings. They are made of a quality of iron of sufficient strength and ductility to allow for the alternate expansion and contraction to which they are subjected, otherwise they would not last longer than one heat. Chills used for casting chilled-rolls are made in sections. "Contracting-chills" are used for casting chilled car wheels, and are so constructed that as the metal of the wheel cools and contracts, the chills close in and keep in constant contact with it.

Cinder-bed or **Coke bed.**— The first layer of coke placed in a cupola previous to the introduction of the iron. Its weight bears a definite relation to that of the iron, but varies with the condition of the furnace. The term "cinder-bed" is also applied to the beds of cinders sometimes placed under the molds and with which the vents are connected.

Clamping.— The weighting down of the cope of a closed mold preparatory to "pouring," to prevent its raising by the lifting force of the metal. It is accomplished by means of various forms of clamps and weights, the latter consisting usually of pig iron piled on the cope, or cast-iron bars ranging from 1,000 to 2,000 pounds in weight, which are hoisted into position by a crane.

Cleaning or **Cleaning-up.**— The smoothing of the surfaces of a foundry mold with trowel and cleaners, and blackening, preparatory to "closing" and "casting." Also, the removal of sand from castings by means of wire brushes and files, by means of tumbling-barrels, and by various pickling processes.

Closing-up.— The placing on of the top-box or cope of a mold in readiness to pouring in the molten metal.

Cold Shuts.— When cast metal pours thick, or when it is poured into the mold too slowly, it is liable to thicken and partly solidify in those portions of the mold where the casting is thin, thus preventing the metal, which follows, from properly amalgamating with it. The imperfectly united contact surfaces thus formed are called "cold-shuts," "cold-shorts," or "cold-shots."

Cope.— The top box or upper half of a green-sand mold.

Core.— A form for shaping an interior hollow portion of a casting. It may consist of a body of green or dried sand placed in a mold to exclude molten metal from the central or inner portion of a casting. They are made either in boxes called "core-boxes," or struck to shape upon a revolving bar, a mixture of loam being used for the body and the required outline imparted to it by revolving it against the beveled edge of a templet board called the "loamboard."

Drag.— The bottom section of a mold. In "bedding-in" work, the portion of the mold in the foundry floor.

Drawing.— See Rapping.

Drawing of Temper.— The heating of steel to redness and then allowing it to cool slowly in the air. The reverse of "hardening" and "tempering."

Drop Forging.— The method of forging iron by driving or pressing it into a die placed under a drop hammer. It is employed when a number of forgings of the same pattern are required. A great deal of this class of work is now accomplished by the use of steam-hammers and forging-presses. See **Machine Forging.**

Fagoting.— The piling up of lengths of puddled bar iron in fagots or bundles for the purpose of reheating and rolling.

Feeding.— When molten metal cools, the outside portions will set first, while the inside portions will remain fluid for some length of time. As the inner portion cools, it will contract and shrink upon itself and leave a depression on the top face of the casting. To avoid this condition the heavier portions of the casting are fed with metal through a small rod called the "feeding-rod," inserted through the runner or the riser, which by its motion keeps a passage open for the inflow of the fresh metal introduced to compensate for the contraction. The metal used for this purpose is called the "feeding-head."

Flask.— The box which holds the sand in which the pattern is rammed-up in the making of a mold. Flasks are made either of wood or of metal, and are parted horizontally into two or more sections. In a mold composed of two parts, the lowermost or the one which is molded first is called the "drag," and the uppermost, or the one which is on top when the casting is poured, is called the "cope." When a flask consists of more than two parts, the sections between the cope and the drag are called "checks" or "intermediates." Flasks are provided with two loose covers called top and bottom boards, and they are designated as "two-part flasks," "three-part flasks," "four-part flasks," etc., according to the number of the component parts.

Floor Rammer.— A flat-ended iron tool employed for ramming over large surfaces of sand.

Fluxes.— Substances used in a smelting furnace for combining with the earthy and other infusible matter present in ores, and which require to be separated from the metal, and which cannot otherwise be rendered fluid at the temperature of the furnace. The flux most widely used is a carbonate of lime in the form of limestone, clam and oyster shells, chalk, dolomite and calcite. Magnesia, fluorspar, feldspar and calcspar are also suitable for this purpose. The by-product of the furnace secured by such flux is called "slag."

Forge.— The structure upon which a smith's fire is maintained. Forges are constructed of brick, or brick and iron combined, or entirely of iron. A forge consists of a hearth, tuyere, chimney, bonnet and troughs for water and coal. The blast may be produced either by bellows, or by rotary blowers or a fan.

Gaggers.— Short, conical projections cast upon the core-plates and the plates of loam-molds for the purpose of assisting the adhesion of the loam. The term is also applied to the hooks of cast iron or of wrought iron which are hung from the cross-bars of a molding box into the mold to prevent the sand from sliding out when the cope is lifted. They are necessary when the body of sand is more than sixteen inches square in area.

Gate.— The opening in the sand of a mold, which connects the "sprue" with the interior of the mold. The sprue is the orifice through which the molten metal is poured into the mold. Both terms are also applied to the bodies of metal which occupy the respective passages after the casting has been poured.

Hardening.— The hardening of a metal is the result of an increase in its density. Few metals are capable of being hardened. The hardening of steel is effected by heating it to a cherry-red temperature and then chilling or cooling it suddenly by plunging it in water, oil or other suitable solution, or by exposing it to a cold blast. The degree of hardness that may be attained depends upon the suddenness of the chilling. In hardening and tempering tools, such as machine knives, taps, long twist-drills, reamers, milling cutters, etc., the danger of warping them by uneven heating or by cold draughts, is avoided by heating them in special hardening and tempering furnaces. See Case Hardening and Tempering.

Lifting.— The drawing out of a pattern from a mold. Also applied to the raising up or springing up of the cope or top-part of the mold caused by the pressure due to the head of the molten metal. This tendency is counteracted by the use of screw-bolts, clamps and dead-weights. See Clamping.

Loam Work.— The making of molds in loam, as distinguished from that of molding in sand. The loam used in foundries consists of a mixture of clay, sand and horsedung, ground up with water by means of a form of mortar mill called the "loam-mill." When cold, the loam has sufficient consistency to be struck up to any desired outline by means of a "loam-board." See Core.

Match-plate.— A form of mold-board or plate of metal on the opposite faces of which two different portions of a pattern are attached. When the boxes containing the impressions are brought together, they constitute a complete mold. In some cases they are very useful for facilitating the making of joints, but they are generally used for making molds for castings having plain outlines, without sharp corners, cores or projections.

Mold-boards.— Boards used for making molds for small castings having irregular joints. Their chief advantage consists in the saving of time and labor in forming the joints. The wooden mold-board is carved out in the desired shape of the joint. The plaster of Paris mold-board is used in cases where the pattern is very crooked, and where the other types cannot be made as cheaply, or to fit with the same amount of accuracy. The sand-and-composition mold-boards are the kind generally used, and obviate the necessity of ramming the sand. The composition consists of 20 parts of fine dry sand to one part of litharge, tempered with linseed oil.

Molding or Founding.— The making of molds for metal castings. The molds are made in sand, loam and plaster of Paris, with or without the aid of patterns. There are three classes of molding — green-sand molding, in which damp sand is used, and the castings are made in damp molds, or in molds the surfaces of which have been "skin-dried;" dry-sand molding in which the damp sand molds are thoroughly dried in an oven preparatory to casting; and loam molding. See Loam Work.

Molding Sand.— Sand is used for molding, in preference to all other materials, on account of its refractory nature, which enables it to resist the destructive action of molten metal at high temperatures; on account of its porosity, which allows the free escape of the gases generated in casting; and on account of its peculiarly compact and adhesive properties, which not only permit of its being molded to any desired shape, but also enable it to resist a great amount of pressure exerted by a liquid. The best molding sand is obtained from the coal measures, and the later red sandstone formations. Sand from the green-sand and chalk formations is also very satisfactory. The most suitable sand is that which contains a large percentage of silica, with alumina and magnesia present in small quantities. The various grades of molding sand are designated as green-sand, dry-sand, core-sand, facing-sand, and parting sand, according to the purposes for which they are used.

Molding Tools.— The molder's small tools are a variety of spoonlike slicking tools, a lifter, an oval or "dog-tail," a heart and square, and square and half-round corners, for more perfectly shaping the sand molds.

Nowel.— The inside or core of a large mold. The name is also sometimes given to the drag.

Odd Sides.— See Mold-boards.

Parting.— The act of separating the different parts of a mold-box. Also applied to the process of making the sand-joint between two contiguous mold-boxes; also to the joint itself.

Pouring.— The filling in of a mold with molten metal in making a casting.

Print.— A projection placed upon a pattern to indicate the position of a cored hole, and to form an indentation for the reception of the end of the core. "Pocket-prints" and "parallel-prints" are used at the sides of the patterns.

Rapping.— The process of loosening a pattern from the sand by gentle rapping previous to its withdrawal. This is effected by inserting the pointed end of the "rapping-bar" into the "rapping-hole" bored in the pattern or in a plate of malleable iron called the "rapping-plate," screwed on the face of the pattern. Small round-faced wooden mallets, called "rapping-mallets," are used in the actual process of withdrawal, which, unless carefully performed, will not only damage the pattern, but will enlarge the molds of small castings to a very appreciable extent.

Riddle.— A coarse sand sieve of about half-inch mesh, used for sifting coarse and old sand.

Riser or Air Gate.— A vertical opening which extends from the mold, through the cope, to the outer air. When it fills up with the molten metal it indicates that the mold itself is full.

Sprue.— A projection on a casting caused by the opening in the gate. It is designed to be cut off and discarded.

Tempering.— In foundry work, the process of mixing various grades of sand. In forge shop work, the imparting of a definite degree of hardness or elasticity to steel. It is effected by either raising or letting down the metal to a certain temperature and then cooling it from that temperature by plunging it in water or oil. The degree of temperature is indicated by the various colors assumed by the steel during the heating part of the process. It may also be determined by the flashing point of a fat.

Venting.— The piercing or honeycombing of the sand of a mold by means of a long wire-rod, one-eighth or one-quarter inch in thickness, thrust in all directions, for the purpose of allowing the free escape of the gases generated by the decomposition of the moisture in the sand by the heat of the inflowing metal.

For further information relative to the various processes akin to founding see BOILER SHOP TERMS, WORKSHOP TERMS and MACHINE FORGING.

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FOUNDRY PRACTICE. Casting.— The casting of brass has been practised from the earliest times and is mentioned in the oldest books of the Bible. Before the year 1300 wrought iron was made directly from the ore. This nearly pure iron cannot by ordinary methods be made sufficiently fluid to run into molds. By special methods in recent years it is made into steel castings (q.v.). At ordinary casting temperatures it is pasty and can be forged into various shapes. Until 1700 castings were generally made directly from the blast furnace in which cast iron was made from the ore. The first casting known to have been made in America was a small round-bottomed kettle with a cover, made at Lynn, Mass., in 1642, at the first blast furnace erected in this country. In 1722 a French founder made the first primitive cupola. Foundry practice dates from that time. The ordinary cupola was an upright iron furnace thickly lined with firebrick, in which were placed alternate layers of pig iron and fuel. A tap-hole at the bottom served to draw off the molten metal to fill the molds in casting. Before the beginning of the last century rarely more than a single casting was made from one pattern. Each new form required a new pattern as well as mold.

The only foundry equipment until recent years was the cupola, a blower, a gib-crane, ladles, cleaning mills, sweeps for loam work and the molder's individual tools: a shovel, bellows, rammer and trowels, some of which are called slicks. By the duplication of castings from patterns in later years molders have become expert in special classes of work, especially when working by the piece. When large numbers of a single kind of castings are to be made a molding machine can be employed advantageously and these are rapidly coming into use. Machines can be operated with comparatively unskilled labor. Modern foundries are equipped with electricity and compressed air, traveling cranes and trolleys, which are used to transport materials, and to do the heavier part of the molder's work. While permanent metal molds are used for the softer metal castings, they have not been made successful for brass or iron. The improvements in machine forging have led to the discarding of many parts of machines formerly cast, but now made much more durable in wrought iron or steel. See MACHINE FORGING.

Sand of various grades is used almost universally for molds, and the founder's art consists in the making of sand molds. Molding sand is a mixture of silica sand and clay with from 10 to 15 per cent of impurities. It is strong if when dampened and pressed into shape it will not fall apart. Fine sand gives light castings a smooth skin. Heavy castings require a coarse open sand. The reddish color of molding sand comes from iron oxide. After the castings are removed from the sand it is shoveled into a row, then, with the shovel, opened up and sprinkled evenly with water. The next morning beginning at one end the heap is cut over, giving each shovelful a twist to scatter the sand evenly over a new heap. About once a week enough new sand is added to make up for what is burned out.

Molding.— The different branches of molding have much in common. We will describe the simplest form and then show where the other forms differ.

Bench Molding.— The patterns for toys, hardware, small parts of stoves, light malleable iron and many brass castings are made of metal, gated together so that the card of patterns is handled as a single piece. Melted iron is poured into a vertical sprue and runs to the mold through horizontal passages called gates. The card of patterns is bedded in a mold-board called a match which closely conforms to every parting or horizontal edge of the pattern.

The molder works standing, his match of patterns being placed on a frame or bench, with his heap of sand beneath and at the side. The mold is made in a snap flask, the lower part of which is the drag and the upper part the cope. These are guided together by flask-pins and both are hinged at the corner and hooked together at the opposite corners. The pattern is thoroughly brushed when the drag is inverted on the match. About half an inch of sand is riddled over the surface of the pattern. The drag is then heaped up with sand with a shovel. Then with a hand rammer, about 13 inches long, in each hand, the molder penes the edges of the drag twice around with the flat pene of the rammers, and levels off the surface with the side of the rammers. With the round butt ends the whole surface is rammed solid. The surplus sand is struck off with a straight edge, a little sand is sprinkled over the surface and a bottom board is rubbed to a fit. This with the drag and match are rolled over and the match is lifted off leaving the pattern bedded in the sand, when all loose sand is blown off with a bellows, and necessary repairs are made with a slick. The cope is put on, the sprue pattern is set on a pin in the gate pattern and a little parting sand is dusted over the surface. This burned parting sand, cleaned from castings, prevents the cope from sticking to the drag.

The cope is rammed the same as the drag, the loose sand brushed off, the sprue removed and the hole smoothed with the fingers. The cope is lifted and placed on edge just behind the drag. The pattern is drawn and is held in the left hand while a bag of charcoal facing is shaken over the mold with the other. The pattern is printed back, rapped and drawn. The cope is then replaced on the drag, the flask is unhooked and the sand mold with its bottom board is set on the floor.

A molder in seven hours will make from 70 to 150 molds. They are stacked two or three high. Wooden frames or jackets are slipped over some molds to prevent the iron from bursting out at the sides. In pouring the molds, cast-iron weights with slots in them to expose the sprue holes are placed on the row of molds nearest the bench to prevent the iron from raising the cope. These weights are changed as fast as a row is poured.

Floor Molding. (Stove plate, etc.).— Each piece is molded in a wooden or in an iron flask. The cope is barred with cross bars six or seven inches apart, with the lower edges conforming to the shape of the inside of the pattern and about one inch away. If the bars are of iron they have holes cast in them and if of wood nails are driven in the lower edges to prevent the sand from dropping out. The pattern, usually of iron, is fitted to a wooden mold-board. The gates are generally separate from but set against the pattern. Whenever possible flat gates are used.

The molder's floor is perfectly level and generally of brick or cement. The sand heap extends the whole length and the flasks and mold-boards are piled at one side.

The pattern on its mold-board is placed on the front of the floor. The pattern is brushed, the drag is inverted on the board, sand is riddled on and then heaped up with a shovel.

The rammer for all floor work is about four feet long with a metal pene and butt. Sand is *pened* twice around the edge of the flask to prevent the iron running out and to make a hard parting. The sand is leveled with the hand and then stepping on the sand, by a series of backward jumps, the molder jumps it off, in rows lengthwise and crosswise. He then butts it all over, a little harder under the gates. He fits the bottom board, then removes it, cuts gutters across especially under where the gates will be and runs a vent wire one-eighth of an inch in diameter all over the drag nearly to the patterns. Then replacing the bottom board and clamping together the bottom board, drag and mold-board the mold is rolled over. After knocking the clamps off, the molder removes the mold-board, puts on the cope, and fastens it to the bottom board with clamps opposite each sprue. The sprue pattern is put in place, sand is riddled on, and then shoveled one quarter full. Then with a hand on each side of each bar, the sand is tucked with the fingers under the bar and around the sprues. The cope is heaped with sand and is pened around the sides of the cope and on each side of each bar. Then the sand is gathered by the hands between the bars and jumped off. The molder cleans the bars of sand and butts the sand all over, being careful not to hit the bars or the sand will not lift.

All loose sand is brushed off the surface of the mold and the sprue is removed. Metal wedges are pressed in between cope and drag at each corner, the clamps knocked off, and the wedges pushed clear in. The cope is rolled up nearly perpendicular and held there by an old file or piece or rod. The sprue is taken out and with a bellows all loose sand is blown from the drag and from the front and back of the cope. The sand is sponged at the edges of the pattern and the set gates.

After the pattern is drawn lead facing is dusted from a bag all over the mold to prevent the sand burning into the iron. Then charcoal facing is dusted on to prevent the lead sticking to the pattern. After printing the pattern back in the mold the set gates and pattern are drawn and the flask is closed and clamped. The iron should be poured as dull as possible to prevent the sand from burning into the iron. In the molding thus described the man molds the same piece over and over and becomes very expert, and generally working by the piece makes very good wages.

General Jobbing and Machinery Castings. (Roll Over Work.)— The previous description applies to this class also. Patterns are generally of wood and are made one-eighth inch per foot larger than the casting to make up for shrinkage. The pattern tapers at least one-eighth inch in a foot to help in drawing the pattern. Any overhanging parts of a pattern must be held by dowel-pins and such parts are drawn after the other part of the pattern is out.

It is better to have iron enter a mold from the bottom and for this purpose the sprue passes down to the bottom of the pattern and across to the mold through a hollow core molded into the drag. One or more risers are placed on the highest points of the mold through which the iron will rise after the mold is full. Dirt and gas will rise also and the riser may be large enough to allow churning with a rod to keep open a channel to the centre of the casting and through which melted iron may be poured to prevent spongy spots forming in the parts that cool last.

Flasks may be of three or more parts. Deep molds are rammed up in courses and harder in the lower portions to resist the head of metal. No soft spots, causing swells, or hard spots, causing scabs, must be made near the pattern. For heavy work about one inch of sand mixed with seal coal (ground bituminous coal) is riddled on all surfaces of the pattern to make a smooth casting.

When possible a pattern is made in two parts, divided at the parting line, allowing the drag part to be laid on a flat board. When an odd job is made without a mold-board a cope is inverted on a bottom board and rammed with sand and struck off. The pattern is roughly bedded in this sand.

Parting sand is thrown over the surface and the drag is rammed up. Then the mold is rolled over, the cope is taken off and the sand shaken out. The drag is then finished and the cope put on and the mold is finished.

Where there are deep places in the pattern the molder tucks sand around large nails with the heads down near the pattern, or sticks called soldiers, or gaggers, L pieces of rod or of cast iron, the toe being near the pattern and the long end along the side of the bars. These must be tucked with the fingers and pened thoroughly. The molder then finishes the cope, venting thoroughly, especially around the sprues.

Molding by Bedding In.— In the foundry floor are pits filled with molding sand level with the floor. A hole is dug in this sand to take the pattern, around which the sand is packed. To allow for the escape of gas generated by a large quantity of iron, the hole is dug deeper than required for the pattern and a bed of very fine cinders is packed and connected by a pipe with the surface of the floor. The cinder bed is covered with sand. If the pattern is not deep or for open sand molds, the sand is leveled off even with the floor. Sand is packed in four small piles at the corners of the bed and two straight edges are leveled on these piles. Sand is tucked solid about these straight edges. Sand is then shoveled inside and outside and rammed hard outside the straight edges. The sand between is struck off.

After the molder has riddled sand three-quarters of an inch thick over the whole surface he places two strips about eight inches long and one-quarter to one-half inch thick on the ends of the straight edges. With a third straight edge on these strips he with his helper presses down first one end of the straight edge and then the other, moving across the bed, making all of an even hardness. He strikes off and vents all over the surface down to the cinder bed. Then with a fine sieve, a little facing sand is riddled over the whole surface and it is smoothed with a trowel. Strips of wood equal to the thickness of the casting are laid on the bed to represent the outside of the casting and the outside of the mold, and the gates are built up with sand. If pins or lugs are required on the lower surface, a pattern for them is pressed into the sand at the required points. A casting more than three inches thick is made with a cope.

Bedding In with a Cope.— If the upper surface of a casting is to be perfectly flat the cope with sprue holes may be rammed on any flat surface and can be set on the mold already bedded in the floor.

If a pattern with an uneven top surface has been bedded in the floor a cope is set in place and stakes are driven about it in the floor to insure its location, and the cope is then rammed. To raise the cope, flat boards are laid on the sand and with crowbars the corners are started, then it is lifted with the crane.

The cope is replaced and held down with iron weights so that the head of metal cannot raise it. Very large and complicated molds can be made in green sand. The mold may be formed by templets and by parts of patterns.

Sand may be built out from the sides by inserting anchors, or separate cores may be used. Such molds are faced by painting on lead facing with a camel's hair brush or by rubbing facing on with the hand.

Dry Sand Molds.— These are made from sand richer in loam than that used for green sand molds. They are made in iron flasks with iron bottom boards. The molding is substantially the same as green sand except that all joints are beveled back from the mold so that when the cope is put on the edges will not crush. This causes a fin on the casting which is chipped off. The cope and drag are placed in an oven and thoroughly dried. Dry sand castings are more sound than if made in green sand.

Skin Dried Molds. (To obtain the advantages of dry sand molds, and of green sand bedded in work.)— Ordinary floor sand is used for the mold except the two inches of sand which faces the mold which is as rich in loam as for dry sand work. If the surface of an ordinary mold is to be only slightly dried, molasses water or thin clay water may be sprayed on the surface to make it strong when dry. A mold when finished is generally skin dried to a depth of one or more inches. Iron baskets filled with burning charcoal are hung in different parts of the mold or heated plates may be held near the surfaces or gas flames may be directed against the surfaces.

Loam Molding.— The body of the mold is built on iron plates with ordinary red brick laid in black mud, which is ordinary floor-sand mixed with clay wash. Some mix sawdust with the mud to make it porous and to help in drying the mold. Straw is sometimes laid in the joints for the same purpose. Pushing a vent wire between the joints also gives vent. This body is built about three-quarters of an inch away from the surface of the finished mold. On the brick surface is spread loam which is a mixture of sand, clay and water. This is faced off with trowels or sweeps. If the mold is circular such as a cylinder or a kettle, a spindle is located at the centre of the mold. On this is fixed arms on which are fastened sweeps or templates. Made up cores are also used for giving shape to parts of the mold.

The outside or the inside of the mold with the bottom can be finished first as is most convenient. It is then taken to the oven by the crane. While this is drying the other part is built up and finished and dried. All parts are then put together, the bottom and top plates being bolted together with rods. A crib is built about the mold with steel or cast plates bolted together. Sand is rammed between the brick work and the casing, as hard as possible, forming also the gates for taking iron to the bottom of the mold. Water pipes and other specialty castings are made in iron molds fitted for the purpose and molding machines are used to a great extent for such work. Every different pattern presents problems which require different treatment.

Cores are used in all classes of molds. An iron anchor may be coated with green sand and set in a mold. Dry sand cores are made of silica sand mixed with a binder such as floor, rosin or oil. When baked these binders make the core hard and strong, and the melted iron burns the binder so that the core sand falls out when the casting is cold. Cores are generally made in boxes. Wires or iron frames are molded in to give strength. Cores are vented by making channels with wires or by molding in a core and then drawing it out. For intricate cores cords of beeswax are molded in which melt out in baking. Cores are located by core prints in the mold left by the pattern and are held in place by chaplets of various shapes placed beneath to prevent sagging and above to prevent the iron from raising the cores. Nails forced into the mold are often used, the core resting on the heads. Tinning chaplets prevents rusting and helps the iron to fuse their surfaces.

Chilling.— To produce a hard face or surface on castings, chilling is resorted to, as in cast iron car wheels. In this instance the circumference of the mold is made of a heavy ring or iron which tends to cool quickly the surface of the casting. The hardening may extend to a depth varying from 1-32 to 1-2 inch. In some forms of chills a circulation of cold water is maintained to continue the resistance to heat.

Melting Iron.— Iron is melted in a cupola, a firebrick lined vertical cylinder in which is charged layers of coke and iron. A blower forces air through tuyeres near the lower end. The melted iron is tapped out at the front into fire clay lined ladles and taken to the mold by hand ladles or by crane. For very large castings several cupolas are used and melted iron may be held in large ladles for some time while more is being melted. Air furnaces are also used for heavy castings.

Quality of Iron for Castings.— Silicon softens cast iron and decreases shrinkage, therefore a standard measure of shrinkage tells whether more or less silicon is needed. Strength depends very largely upon the size of grain, which is not wholly dependent upon the chemical composition. A thin portion of a casting shrinks more and sooner than a thick part which often causes fracture. It has been erroneously said that cast iron expands at the instant of solidification.

Iron becomes rigid at the surface of the mold while the central part is fluid. When all is solid, and just about as it ceases to be red hot, the casting expands more or less at the same time that carbon crystallizes into graphite.

In a casting one inch square this expansion occurs about 15 minutes after the iron enters the mold, but in a casting four inches square it occurs two hours after. This expansion at different times of parts of a casting of varying thickness, at the same time that the casting is shrinking unevenly from the loss of heat, produces severe strains which often fracture the casting. The remedy is to make all parts of equal thickness and to uncover thick portions as soon as solid. There are 50 factories in the United States making foundry supplies, giving employment to about 500 men, and adding more than $1,000,000 to the value of the products they handle. They supply various mixtures of sand and plumbago and sea-coal, as well as charcoal facings to keep the metal from adhering to the molding sand. They also sell parting compounds to facilitate separation of the parts of the molds; for this purpose clay and hydrocarbons are employed. Their other products are brazing and welding compounds, foundry «flour,» plumbago and founders' small supplies, as brush-wheels, rammers, sieves and flasks.

William J. Keep,
Author of 'Cast Iron,' etc.

FOUNTAIN, or ARTIFICIAL FOUNTAIN, in hydraulics, a construction by which water is violently spouted or darted up; called in French a *jet d'eau*. There are various kinds of artificial fountains, but all formed by a pressure of one sort or another on the water, namely, either the pressure or weight of a head of water, or the pressure arising from the spring and elasticity of the air, etc. When these are formed by the pressure of a head of water, the fountain will spout up nearly to the same height as that head. In ancient Greece every principal town had public fountains or conduits, some of which were of handsome design and of beautiful execution. The most famous of these were at Megara, at Corinth (the Pirene and the Lerna), in the sacred wood of Æsculapius, at Epidaurus, and the two at Messina called Arisinoë and Clepsydra.

The ancient fondness for fountains still exists in Italy and the East. The French are celebrated for their fountains, but Italy, more particularly Rome, is still more so. The fountains of Paris and of the Tuileries, of the orangery at Versailles, at Saint Cloud, and other places in the neighborhood, are splendid structures. The principal and most admired fountains at or near Rome are those in front of Saint Peter's, of the Villa Aldobrandini at Frascati, of the Termini, of Mount Janiculum, of the gardens of the Belvedere, in the Vatican, of the Villa Borghese, which has also in the audience chamber a splendid fountain of silver, five Roman palms in height, ornamented with superb vases and flowers; the fountains of Trevi, the three fountains of Saint Paul, of the Aqua Acetosa, etc.

In the United States the ornamental type of fountain is the one in common use. Large display fountains were attractive features of the Centennial Exhibition, and at the Chicago World's Fair, Buffalo Pan-American Exposition and San Francisco Exposition. Among these was the Fountain of the Republic of Chicago, which was designed by MacMonnies, and at Buffalo were costly examples dedicated to Man, Nature, Progress, etc. In Central Park, New York; Fairmount Park, Philadelphia; Lincoln Park, Chicago; Golden Gate Park, San Francisco and other large parks, will be found numerous fountains of elaborate design. In all the larger cities drinking fountains for men and animals have been erected by individuals and local humane societies.

FOUNTAIN PENS. See LITERARY LABOR-SAVERS.

FOUNTAINS ABBEY, one of the largest and best-preserved monastic edifices in England, in the West Riding of Yorkshire, three miles southwest of Ripon. Founded for Cistercians in 1132, it was not completed till the 16th century, and thus presents examples of every variety of style, from Norman to Perpendicular.

FOUQUÉ, foo-kā', **Friedrich Heinrich Karl,** BARON DE LA MOTTE, German poet and novelist: b. Brandenburg, 12 Feb. 1777; d. Berlin, 23 Jan. 1843. He was a grandson of H. A. Fouqué (q.v.); served as lieutenant of the Prussian guards in the campaign of 1794, and was present in 1813 at the most important battles in the War of Liberation. As a writer he is remarkable both for variety and fecundity, and published poetry in almost all its forms — dramatic, epic, romantic, etc. Several of his short romantic tales in prose, such as 'Der Zauberring' (1813), 'Aslauga's Ritter,' but more especially his 'Undine' (1811), enjoy an extraordinary popularity. The last mentioned tale, a charming mixture of fairy ideality, the reality of humble life, and the glow of chivalry, has gone through many editions, and has been translated into every European language. It must be admitted that Fouqué, while possessing many of the virtues of the romantic school, was guilty of all its extravagances, and that the descriptions of chivalric and feudal life, in which he delighted, are mere fancy pictures. His autobiography appeared in 1840. See UNDINE.

FOUQUÉ, Heinrich August, BARON DE LA MOTTE, Prussian general: b. The Hague, Holland, 4 April 1698; d. Brandenburg, 2 May 1774. Fouqué possessed the confidence of Frederick the Great; and the 'Mémoires du Baron de la Motte Fouqué' (1788, by Büttner, the secretary of Fouqué), which contain his correspondence with Frederick the Great, are of great interest.

FOUQUET, or **FOUCQUET, Jehan,** French artist: b. Tours, about 1420; d. about 1480. He studied at Tours, Paris and Italy, and was greatly influenced by the Flemish and Florentine masters. While in Italy about 1445 he painted the portrait of Pope Eugenius IV, which has lately been lost. He was after his return made court painter to Charles VII and afterward to Louis XI. Long remembered solely as a miniature painter it is only in recent years that his importance as a founder of the French school has been recognized by historians of art. Specimens of his art are in the Louvre, in Vienna, in the Antwerp Museum, and probably one in the Berlin Museum. Of his illuminations the best known are the series of miniatures for a French edition of Boccaccio now in the Munich Library. Others are illustrations for Josephus' 'History of the Jews' in the Bibliothèque Nationale, Paris. Consult 'Œuvres de Jehan Foucquet' (Paris 1867); Lafenestre, 'Jehan Fouque' (Paris 1905) and Richter, 'Chantilly in History and Art' (London 1913).

FOUQUET, foo-kā, **Nicolas,** French statesman, VISCOUNT DE MELUN AND DE VAUX, AND MARQUIS OF BELLE ISLE: b. Paris, 1615; d. Pignerol, 23 March 1680. He received in 1650 the important appointment of procureur-général to the parliament of Paris, and three years later was advanced to be superintendent of finance. His rapid advance made him ambitious of succeeding Mazarin as first minister, but he had a formidable rival in Colbert. Fouquet's plans were, however, brought to naught; for in the first place Louis himself took the reins of power into his own hands when they slipped from the grasp of the dead cardinal, and in the second place, instigated thereto by Colbert, he suddenly arrested Fouquet in September 1661. After a trial extending over three years, Fouquet was sentenced to perpetual exile and the loss of all his property, but the sentence was afterward altered to life-long imprisonment. From the circumstance of his imprisonment at Pignerol, Fouquet, in spite of the fact that he died in 1680, has been misidentified with the Man With the Iron Mask (q.v.), who, however, lived till 1703.

FOUQUIER-TINVILLE, foo-kē-ā tăn-vēl, **Antoine Quentin,** French revolutionist: b. Hérouelles, near Saint Quentin, 1747; d. Paris, 7 May 1795. As a member of the revolutionary tribunal he distinguished himself by his alacrity in pronouncing the verdict of guilty, and attracted the attention of Robespierre, who gave him the office of public accuser before this tribunal. The victims now became numberless. Fouquier drew up the scandalous articles of accusation against the queen, Marie Antoinette. His thirst for blood seems to have been increased by gratification, until it became a real insanity. He proposed the execution of Robespierre and all the members of the revolutionary tribunal 9th Thermidor, 1794, was himself removed on the 14th Thermidor (1 Aug.), 1794, and arrested. He died under the guillotine. There does not appear to be a trait in the life of this monster which can entitle his crimes to the same palliation as those of Robespierre, who considered the extermination of the aristocracy as a necessary evil. Consult Domenget, 'Fouquier-Tinville, et le tribunal révolutionnaire' (1878).

FOUR-EYED FISH, a fish of the genus *Anableps.*

FOUR-HORNED ANTELOPE, or **CHOUSINGHA,** the genus *Tetraceros* of the antelope group, native to India, and differing from all other living ruminants in that the male generally bears two pairs of horns. It is closely related to the African duikerbok (q.v.), which it resembles in the position of its larger horns, and the shape of its eyes, as well as in other ways. The smaller horns rise from just above the eyes. This antelope is a pretty, brownish creature, standing about 25 inches at the withers, and is found from the foot of the Himalayas southward over India, in wooded hill-country, but it avoids dense jungles. It drinks daily, and hence never wanders far from the water. It is exceedingly shy, and escapes, when discovered, in a series of jerky, though very rapid, bounds, into the cover of long grass or low bushes.

FOUR LAKES, a chain of lakes in Dane County, Wis.; known respectively as First, Second, Third and Fourth lakes. First Lake, the smallest and lowest of the chain, is about 3 miles long by 2 miles wide; Second Lake is 3½ miles long by 2 broad; Third Lake is 6½ miles long by 2 miles wide; Fourth Lake, the largest and most beautiful, is 6 miles long by 4 wide. The waters of these lakes are navigable for small steamers. The two last are now called lakes Monona and Mendota.

FOUR-O'CLOCK. See FRIAR-BIRD.

FOURCHAMBAULT, foor-shäm'bō', France, town in the department of Nièvre, on the Loire, four and one-half miles northwest of Nevers, on the Paris-Lyon Railway. It has large iron works, which produce engineering material for railway, military and other purposes. Pop. 4,882.

FOURCROY, foor-krwä, **Antoine François de,** French chemist: b. Paris, 15 June 1755; d. 16 Dec. 1809. Having adopted the profession of medicine he applied himself closely to the study of the sciences connected with it, especially to chemistry, and published in 1776 a translation of Ramazzini's 'Treatise on the Diseases of Artisans.' He was professor of chemistry at the Jardin du Roi, 1780–1805. He organized the central school of public works, out of which the polytechnic school afterward sprang, and co-operated in the establishment of the normal schools. In 1799 Bonaparte gave him a place in the council of state, in which place he drew up a plan for a system of public instruction, which, with some alteration, was adopted. His works are numerous, among which the following are the most important: 'Leçons Elémentaires d'Histoire naturelle et de Chimie' (1791); 'Système des Connaissances chimiques, et de leurs Applications aux Phénomènes de la Nature et de l'Art' (1805); 'Philosophie chimique'; 'Tableaux synoptiques de Chimie' (1805); and 'La Médecine éclairée par les Sciences physiques.'

FOURDRINIER (foor-drĭ-nēr') **MACHINE,** a paper-making machine, the first to make a continuous web. It was invented by Louis Robert, of Essonne, and patented by him in France. A Mr. Gamble and the brothers Fourdrinier improved it. The machine was perfected by others. See PAPER.

FOURIER, foo-rē-ā, **François Charles Marie,** French social economist: b. Besançon, 7 April 1772; d. Paris, 10 Oct. 1837. He studied at the college in his native town, and obtained a mercantile position at Rouen; he later entered into business on his own account at Lyons, having inherited a small fortune from his father, but the siege of the city by the troops of the convention in 1793 and the subsequent disorders were fatal to his prosperity; he was arrested and kept a prisoner for some time, and afterward served two years in the Revolutionary army, being discharged in 1796 because of failing health. While employed at Marseilles, in 1799, his employers retained a cargo of rice in order to keep up the price, and when it became unfit for use ordered Fourier to throw it into the sea. This experience led him to question the righteousness of the existing industrial system and to develop his own social theory known as Fourierism (q.v.). He first published 'Theorie des quatre mouvements et des destinées générales' (1808), in which he explained the basis of his system, which he developed more completely in 'Traité de l'association domestique agricole' (1822), republished under the title 'Theorie de l'unite universelle,' and in 'Le Nouveau Monde' (1829–30). Consult Pellarin, 'Charles Fourier, sa vie et sa théorie' (5th ed., Paris 1871; American translation, 1845); and Fourier's 'Oeuvres choisies' (1890), with biographical notice by Charles Gide.

FOURIER, Jean Baptiste Joseph, BARON, French mathematician: b. Auxerre, France, 21 March 1768; d. 16 May 1830. He was an active Jacobin during the French Revolution. His later energies were divorced from politics and given up to science. 'Analytical Theory of Heat' (1822) is his most noted work; but in mathematics his speculations and methods are of high permanent utility.

FOURIER SERIES, in mathematics, a trigonometric series first extensively employed by the French mathematician Jean Baptiste Joseph Fourier, in connection with the theory of the movement of heat in a solid body. It was primarily intended for effecting the development of an arbitrary periodic function in the form of a series whose terms are sines and cosines of increasing multiples of the variable. The subject is too technical for discussion in a general encyclopædia. Consult Fourier, 'The Analytical Theory of Heat' (translated by Alexander Freeman); and more especially, Byerly, 'An Elementary Treatise on Fourier's Series, and Spherical, Cylindrical and Ellipsoidal Harmonics.'

FOURIERISM, the social system advocated by F. C. M. Fourier (q.v.). It was based on the theory that the social order depends upon fixed moral and intellectual laws, and that man must discover and live according to these laws. According to Fourier society must be so organized as to give freedom to the passions or desires of man, since these are naturally capable of harmony, and if developed under proper conditions, would, in accordance with the law of attraction, lead to a perfect society. He first intended that marriage should be abolished as imposing an unnatural bondage on human passion and a system of licenses substituted; but this was afterward abandoned. In this society industry should be carried on by phalanxes. Each phalanx was to consist of 1600 persons, residing in a common building; the phalanx to be divided into series, and the series combined in groups; each group was to have charge of one kind of work, and each series of one special branch of that work. In the distribution of products a certain minimum was to be assigned to each member of the society, whether capable of labor or not; the remainder to be shared among the three elements, labor, talent and capital in the proportion of five to labor, three to talent, and four to capital. The capital of the community might be owned in unequal shares by different members of the community; inheritance was to be permitted, and the individuals could expend the remuneration they received as they pleased. The government was to be republican, with elective officers. Fourierism, though socialistic, is not properly socialism, and is related to modern socialism by its sharp criticism of existing conditions rather than by its plan for the future of society.

Fourierism won many converts in France: and so sanguine was its originator that for the last 10 years of his life he waited at noon every day in his apartments for the advent of the financial magnate who was to furnish means toward the realization of his scheme. Among those who advocated the theory were Victor Considerant and Mennier; an association was formed; a periodical, *The Phalange*, was published for a short time; and a number of communities were organized in accordance with the Fourieristic plan, only one of which has survived the co-operative stove factory founded at Guise by Jean Godin, a disciple of Fourier, with its workmen's colony and phalanstery accommodating 400 families. Fourierism was introduced into the United States in 1842, by Albert Brisbane, who for a time published *The Phalanx* in New York. He was welcomed by the members of the Brook Farm community, and the Fourieristic organization was adopted there. For a time the Brook Farm Phalanx published *The Harbinger*, the most important periodical published by the Fourierists in the United States. An organization, known as the American Union of Associationists, was formed for the «popular diffusion of the principles of the associative sciences as discovered by Charles Fourier, with a view to their ultimate realization by the establishment of phalanxes.» Horace Greeley (q.v.) became its president, and George Ripley (q.v.) secretary. A large convention of the «associationists» was held in New York in 1844. In 1847 *The Harbinger* was transferred to New York under the charge of this association, and was published till 1849. About 34 communities were organized by the Fourierists, of which the most important (besides Brook Farm) were the North American Phalanx, which lived 12 years, and the Wisconsin Phalanx. Most of them existed but a short time, and by 1850 the Fourierist movement had practicaly come to an end. Consult Bebel, ‘Charles Fourier’ (1888); Brisbane, ‘Social Destiny of Man’; Ely, ‘French and German Socialism’; Noyes, ‘History of American Socialisms’; Shaw, ‘A Forgotten Socialism’ (*New England Magazine*, new series Vol. VIII, p. 773). See Brook Farm; Communism; North American Phalanx; Socialism.

FOURMIES, foor'mē', France, town in the department of Nord on a tributary of the Sambre, 40 miles southeast of Valenciennes and close to the Belgian frontier. There are iron mines in the vicinity and the town was a chief centre of the wool combing and spinning industry in France. Here were established the first glassworks in France. In August 1914 after the fall of Namur the German armies occupied the town, which had suffered severely from bombardment during the retreat of the French forces. Before the war it had a population of 14,143.

FOURNET, foor'nā', **Joseph Jean Baptiste Xavier**, French meteorologist: b. Strassburg, 1801; d. 1869. He was educated at the Paris School of Mines and was a member of several geological exploring expeditions. He was appointed professor of geology at the University of Lyons in 1834. His knowledge of the geology of the Alps and of southeastern France was unequalled. He made a notable discovery in connection with the sulphurization of metals, which is known as «Fournet's law.» His publications include ‘Géologie lyonnaise’ (1862) and ‘Du mineur, son rôle et son influence sur les progrès de la civilisation’ (1862).

FOURNIER, foor'nĭ'ā', **August**, Austrian historian: b. Vienna, 1850. He was educated at the University of Vienna, was employed in the Ministry of the Interior and after 1875 served as instructor in history at the University of Vienna. He removed to Prague in 1883 and in 1903 returned to the University of Vienna as full professor of history. In 1891–1900 he was a member of the Reichsrat, and of the Bohemian Diet from 1892 to 1901. His most noteworthy work is ‘Napoleon I, Eine Biographie’ (1886–89; French trans.; Eng. trans. by Corwin and Bissell 1903, and by Adams 1912). Other works are ‘Gentz und Cobenzl: Geschichte der oesterreichischen Diplomatie, 1801–05’ (1880); ‘Handel und Verkehr in Ungarn und Polen um die Mitte des 18. Jahrhunderts’ (1887); ‘Der Kongress von Châtillon’ (1900); ‘Historische Studien und Skizzen III’ (1912); ‘Die Geheimpolizei an dem Wiener Kongress’ (1913).

FOURNIER L'HÉRITIER, Claude, French revolutionist, called «l'Américain»: b. Auzon, Haute-Loire, 21 Dec. 1745; d. 1825. He went to America and at Santo Domingo started an establishment for the manufacture of rum, but he lost his fortune in a fire and returned to France. He took part in all the revolutionary activities in France in 1789–92 and was accused of complicity in the murder of the Orléans prisoners many of whom perished while in his charge in 1792. He was acquitted of this charge, but was soon in difficulty again and was deported, not returning until 1809. Two years later he was caught plotting again and was confined in the Château d'If. At the First Restoration he secured his liberty, was later involved in a plot against the Bourbons, was imprisoned and released finally in 1816. His last years were spent importuning the government to recompense him for his lost fortune in Santo Domingo. Consult his 'Mémoires secretes' (ed. Aulard, Paris 1890).

FOURTEENTH CENTURY. Following the great outburst of human achievement which came in the 13th century, the 14th might be expected to present a still higher step in culture in accordance with the law of progress that is often presumed to rule in human affairs. On the contrary, as is so often noted, this great artistic period was followed by a time when art became more conscious, and elements of degeneracy are readily noted. The century witnessed a culmination of its art and philosophy in Dante, who was 35 years of age when it opened. His great poem belongs to the century however, so that the period possesses the greatest poem, if not the greatest poet of all times. The mid-century was subjected to the severe trial of the Black Death, the Bubonic Plague, which ravaged most of Europe, carrying off more than half the population, sparing neither sex nor age, and perhaps as a rule carrying off more of the vigorous individuals than of the weaklings for they were more exposed, and resistive vitality was seldom sufficient to protect any one however vigorous once infection took place.

Medical factors have seldom been given due weight by historians, but the Black Death above all has not been estimated at its true value as a determiner of historical tendencies for a century afterward. To appreciate this, some of the figures of the losses are needed. Florence lost 60,000; Siena, 70,000; Venice, 100,000; Avignon, 60,000; Paris, 50,000; the comparatively small town of Saint Denis, 14,000; while there were smaller towns in France in which but 2 out of 20 of the inhabitants survived, and in Sardinia and Corsica only one-third of the population was left. England is said by some to have suffered even more severely than this, one almost contemporary authority saying that there was scarcely 1 in 10 of the population left. Hecker ('The Black Death,' New Sydenham Society) declares this an exaggeration, yet it serves to show something of the awful ravages that must have been inflicted. He calculates the deaths throughout Europe from the disease at 25,000,000. Historians generally have represented that a great wave of irreligion followed close on the heels of the disease, but Hecker emphasizes exactly the opposite,— a great wave of religious enthusiasm, and above all of penitential exercises. The plague recurred at irregular intervals, and when there came to be a feeling of security there was a reaction toward license, but mainly on the part of the cowards who had fled from various posts of duty and thus saved themselves. It is easy to understand what a revolution in the social order was effected by these immense losses. A great many institutions were seriously paralyzed in efficiency. As pointed out by Gasquet, the clergy suffered particularly. Their duties of affording religious consolation to the sick, which were bravely fulfilled as a rule, exposed them to infection. Large numbers of the religious orders perished because of this, and because the duty of nursing the sick so often incumbent on them was peculiarly dangerous and community life led to the spread of the infection. There were religious communities entirely wiped out or only a few left. A great many of the hierarchy fell victims through their zeal for their flocks and unworthy men, schemers for place, obtained high ecclesiastical positions which they would not have received in the more exemplary times before the Plague. Gasquet has traced a lively picture of conditions that developed in England which may be applied to other countries. The result was a sad degeneration in Church efficiency that gave good grounds for the bitter criticisms of ecclesiastics which are found in the literature at the end of this century and the beginning of the next. A corresponding degeneration took place in every serious phase of life, the progress of art was sadly interfered with, education interrupted for a generation and required several more to catch up with its previous state, while commerce and industry of all kinds suffered in like manner.

The intense interest in education of the beginning of this century is well illustrated by the number of important university foundations during the first 10 years. The University of Lyons was founded in 1300–01; the University of Avignon, 1303; Orleans, 1305; Perugia, 1307; Coimbra in Portugal, 1308. Many of these universities had existed as schools of some importance as a rule, before this, but now were raised to university rank by some formal recognition, usually a Bull of the Pope. The University of Dublin for instance was thus refounded in 1320, a Bull for the erection of a university near Dublin having been granted by Clement V to Archbishop Lech, 11 July 1311.

The Pope as the international authority of the time, regulated the interchange of scholars and professors and the maintenance of standards, and Papal Bulls required the same standards as those of Paris and Bologna, and sometimes demanded that the first professors should be graduates of one of these older universities in order that university traditions might be properly established. The Papal Decrees enacted that examinations for degrees should be conducted under oath so as to insure fairness and even dictated the details of the time to be spent in study and the subjects, before permission would be given to come up for examination. In erecting the University of Perugia, for instance, which was in the Papal States, Pope John XXII insisted that those who were to receive the degree of Doctor of Medicine should have devoted seven years, three of them hearing lectures, in medical science in accordance with the terms for taking the same degree at Paris or Bologna. In erecting the University of Cahors in his native town in France, the same Pope at the end of the first quarter of the century said in his Bull that he wished that here "a copious, refreshing fountain of science should spring up and continue to flow, from whose abundance all the citizens might drink, and where those desirous of education might become imbued with knowledge so that the cultivators of wisdom might sow seed with success and all the student body become learned and eloquent and in every way distinguished."

The first university deliberately founded as such, and not growing out of a school which had developed to a point where a *studium generale* (the mediæval name for University), was the natural next step, was the University of Prague. It was founded by Charles IV in 1348, who ascended the Bohemian throne only two years before. Charles had been a student at Paris and now "in memory of his student life, wished to have a copy of the university there in his Kingdom of Bohemia." (Döllinger). He founded it with all the faculties, conferring on it all the rights, privileges and immunities common to universities. For this he had obtained a Bull of foundation from the Pope in the preceding year, which as Laurie says, gave catholic (universal) validity to its degrees. The Archbishop of Prague became its chancellor. After this date, we find that important universities had usually two charters, the one papal, the other royal or imperial. The University of Prague is noteworthy as the starting point of the great German system. Before the end of the century, universities of the Parisian type were founded at Vienna, Erfurt and Heidelberg, and the University of Leipzig was founded by withdrawal of students and professors from Prague early in the next century, similar to earlier corresponding incidents at Paris and Oxford.

So great was the interest of the first part of this century in education that it seems literally true to say that there were more students at the universities of Europe in proportion to population at this time than at any other in history. The population of the European countries was very small compared to our time. England probably did not have more than three millions, and other countries had inhabitants in the same ratio. There were many thousands of students at the English universities and even with all the discounting of contemporary statistics sometimes deemed necessary, the universities of that time were undoubtedly ahead of ours in the numbers of students in attendance. University students included boys of 12 and over up to mature men well beyond 40. The boys seem to us entirely too young for university work, but it may be recalled that some of our distinguished statesmen of the 18th century received their college degree at 16 or even earlier, and that our present method of delaying graduate work until well beyond 20 is as yet on trial and not favorably viewed by all. The maturer students of the universities of the early 14th century were doing true university work in many cases. They were preparing to be lecturers and were often actually doing what would be called *docent* or *seminar* duties of various kinds; they were writing books and taking part in disputations, sharpening the wits of students, and making the philosophical and theological principles clearer by elaborate distinctions. This intensive work led to an abuse of dialectics in this century, so that the means of getting at truth, that is, logical processes of various kinds, were often mistaken for an end in themselves. The tendency is an academic fault at all times, and technics have in the course of the development of the physical sciences in later days, shared this fate. Students for the degree of Doctor in Philosophy have in modern as in mediæval times occupied themselves often with recondite subjects of very little interest to the public and of still less practical value. The 14th century did witness, however, a decadence in the university thinking out of great principles and their application to pertinent problems, religious and social, which had characterized the 13th century.

Before the end of the century, Italy received its introduction to Greek and accepted it with an enthusiasm which augured well for the evolution of classical study. The Eastern Emperor harassed by the Turks and realizing that it would not be long unless he received aid from the West before his capital must fall, sent an embassy headed by Manuel Chrysoloras, an eminent Greek scholar, to Italy. The Florentines welcomed Chrysoloras to their city and at once offered him a professor's chair in the University (1396). His lecture room was crowded. Not only the young, but the old came to hear him, and it is said that men past 60 "felt the blood leap in their veins" at the thought of being able to learn Greek. Addington Symonds says that "if it be true that except the blind forces of nature, nothing moves in this world which is not Greek in its origin, we are justified in regarding the point of contact between the Greek teacher Chrysoloras and his Florentine pupils as one of the most momentous crises in the history of civilization."

Scholarship rather than literature was the occupation of the university men of this century. Petrarch went so far as to write what he hoped was to be his greatest poem, the work by which he was to live, his epic, 'Africa,' in Latin, though this was a generation after Dante had written his 'Divine Comedy' in Italian. Petrarch could scarcely think that the vulgar tongue was elegant enough to hold thought for any length of time. Italian might do for love sonnets to be read for a generation or two but not for enduring literature. His Latin epic is never looked at now while his sonnets are a world possession. Petrarch's spirit influenced all the universities. It was a time of classical learning, but only of the Latin classics. Greek attracted attention only in the next century. Translations of the Scriptures into the modern languages were being made, and the sublimity of thought in the Bible made even translations of literary value while the familiarity of the people with Scriptural expressions began the fixation of the mother tongues.

The literary monuments of the 14th century make it immortal. Dante's 'Divine Comedy' has been proclaimed by some the greatest poem ever written. It has not only lived, but with certain brief intervals has been a constant source of inspiration to poets, artists and serious students of every kind ever since. Now that the 600th anniversary of his death (1321) is approaching, Dante is higher in world honor than ever. There have been periods of comparative neglect of their greatest poet which have only served to illustrate Cornelius' law, that whenever the Italians appreciate Dante properly, art and literature flourish finely, while whenever he is neglected they are in decadence. The profound influence of Dante over subsequent literature all over Europe can be best gauged by the number of works written with regard to him. The Dante Library at Cornell contains some 9,000 volumes and thousands of other titles of Danteana, and the Dante section of the British Museum contains some material not represented at Cornell. Petrarch in one mode of literature, the sonnet, had a more immediate effect upon European literature than Dante, and gave rise to a flood of sonnets all over Europe. He continues to be the poets' poet at least. Boccaccio created out of older elements a fictional literary mode scarcely less influential than that of Petrarch and his book has been read in all languages ever since, though not so much for its literary value as its abiding appeal to human nature. Italy anticipated the other countries of Europe in the creation in this century of a national literature that was to be a living force ever afterward, but other countries mainly under her influence succeeded in the same achievement. After Italian, English literature had the highest development at this time. Chaucer (1320–1400), probably a student of Cambridge, visited Italy when nearly 50 years of age and came under the influence of Petrarch, then the most illustrious man of letters in Europe. It was after his return from Italy that in imitation of Boccaccio he wrote his greatest and most original work, 'The Canterbury Tales.' Written in an English not very different from that of our time, this is one of the world's great works of literature, full of wit, humor, pathos and knowledge of humanity; written from so close to the heart of nature that it has lived and will live.

John Gower's (1325–1408) 'Confessio Amantis,' a collection of stories like the 'Tales,' written after his friend Chaucer had demonstrated the power of expression of English, and diverted him from his Latin, though he had to display his erudition in the title at least, is mainly of academic interest, a work of pedantry rather than of human nature, but completing our knowledge of the intellectual interests of the time for that very reason by its contrast with Chaucer. The third English literary monument of this century is the 'Vision of Piers Ploughman,' probably by William Langland (1332?–1399?), a clergyman in sympathy with the lower classes. It is a spirited satire against vice and abuses in general, not sparing the faults of the churchmen of that time, emphasized by the social conditions after the Black Death. France possesses one writer of cardinal importance in the period, Froissart, the historian who wrote in prose. England has her corresponding prose writer in the unknown translator of Sir John Mandeville's 'Voyages,' the first to handle English prose as Chaucer did verse, with freedom and independence.

The 14th century presents an unexpected feature of history in the career of a woman writer, who finding herself a widow at the age of 25 with three children to support, proceeded to make a living for them with her pen. This was Christine de Pisan, born in Italy but brought up in France and writing French *ballades, rondeaux* and other poems as well as an immense amount of hack work prose, translations and compilations of all kinds, so that, as she herself says, «in the short space of six years (1397–1403) I wrote 15 important books, without mentioning minor essays which compiled, made 70 large copy-books.» It is indeed illuminating for the time to find the career of this kind in it, and it can scarcely help but revolutionize many commonly accepted notions with regard to mediæval lack of interest in such things and utter denial of opportunities for a successful intellectual life for women who possessed the necessary talent and initiative.

A very interesting development in the literature of this time is that of the mystical writers who in Italy, France, Germany and England wrote works which have continued to live because of the depth of their meaning but mainly for their literary quality. Piers Ploughman in England and Wyclif's work belong to this class. Wyclif's translation of the Bible deeply influenced all subsequent English writers. Gasquet has disputed the genuineness of the versions of Scriptures attributed to Wyclif, and there is now no doubt that the Bible was familiar to laymen before this and that translations of the New Testament in English were common before Wyclif. Two 14th century works in Italian, the 'Fioretti' of Saint Francis and the letters and 'Dialogues' of Saint Catherine of Siena are now attracting wide attention, 500 years later. The 'Fioretti,' which breathes the charm of Saint Francis better than anything ever written about him, has had a striking revival. The development of feminism has brought with it a renewal of attention to Catherine of Siena (1347–80). Though she did not learn to read until she was 25 nor to write until she was 30 (and she died at 33), her «work has survived the wreck of time because she wrote with a passionate tenderness, intense and always present, which her deep feeling transmutes into eloquence.» (Snell, 'Periods of Literature, Fourteenth Century'). She is the classic of Sienese, the other mode of Tuscan, besides the Florentine. These two equally influenced modern Italian. Saint Catherine, who was that curious composite being, «a mystic, a poet, a politician and a saint,» deeply impressed her time. Her life was full of visions, yet she was a great practical social worker who led in the correction of many abuses and the consolation of many sufferings and whose influence became so great that she was the peacemaker of the troubled time, not only between individuals but also cities and states. To her influence more than to any other single factor is due the return of the Popes from Avignon to Rome. In France, Jean Gerson (1363–1429), the chancellor of the University of Paris, deeply moved his own and succeeding generations by his preaching and writing, and the authorship of the 'Imitation of Christ' was for long attributed to him. It was in Germany, however, that mysticism in our modern sense of the word flourished at this time. Master Eckert with John Tauler and Heinrich Seuse, his disciples, created a mode of literature that was to have its culmination in the immortal 'Imitatio Christi' by á Kempis.

Painting had a wonderful period of development during the century. Cimabue at Florence and Duccio at Perugia had made great beginnings in the 13th century, and Giotto in the 14th continued their traditions and brought decorative art to one of its highest points of achievement. His pictures of the life of Saint

Francis at Assisi and his decorations for the Chapel of the Arena at Padua are still the subject of loving study by painters, not only out of reverence for the past but particularly for the fine points of technique which they illustrate for all time. "As compositions in color and as wall decorations with certain architectural effects they have almost never been excelled. As serious and faithful efforts to realize the inner meaning and significance of the Bible stories and of the Franciscan incidents, they are quite as admirable." (Goodyear). Giotto was one of the first to make portrait studies and he has all the qualities of a great portrait painter. He was never surpassed in solemnity and seriousness, in religious feeling and in original power. The work of his students in the Campo Santo Pisa has always attracted loving attention. In Pisa the sculpture of the 14th century flourished, though this had reached a culmination in the preceding century. Giovanni Pisano directed the sculptural effects on the façade of the Cathedral of Orvieto at this time. In this earlier Renaissance, the painter was often a sculptor also, as Giotto's fine plaques for the Campanile at Florence illustrate, and Orcagna's work on the tabernacle of the Oratory of Or San Michele. Pisan sculptors worked throughout Central Italy, and the bronze doors by Andrea of Pisa on the Florence baptistery show how well. Architecture flourished quite as luxuriantly as painting and sculpture, though some signs of decadence are to be seen. The secular buildings of Italian Gothic of this period and especially the great town halls and civic palaces are admirable. Many of these buildings were literally town fortresses to withstand the stormy outbreaks and civic convulsions in which the overflowing vigor of these municipalities found vent, but their massive simplicity adds impressive dignity to their fine lines. Siena, Perugia, Florence, Piacenza contain some beautiful palaces from this time, and above all, Venice is the place to study the development of beautiful palaces of private citizens. There were fountains and other monuments also erected which show that Italy at this time had fully reached the idea of the city beautiful. The interior decorations of these buildings were done by the best painters of the time, and they are still models of artistic taste and charm. Particularly hospitals were the subject of loving attention in this way, as is very well illustrated by the hospital built after her death in honor of Saint Catherine of Siena. It was felt that the ailing poor should have something to occupy their minds during the time while they were confined to the hospital. The city built its public buildings for its citizens and nothing was too good for them and then had them decorated fittingly. At times, the decorations or portions of them were done by artists who had been cared for by the hospital and who wished to leave a substantial memorial of their gratitude. Instead of being deterrent, then, hospitals became some of the most attractive of municipal structures. The museum as such was unknown but the various public buildings, cathedral, town hall, hospital, took its place, and the pictures made for them were thus exhibited in a suitable environment.

The severe shock to humanity caused by the immense mortality of the Black Death and the serious disturbance of social life due to its ravages made the people of the end of the century incline to hysteria. It is very probable that not a little of this was due to the fact that the braver souls among men had nearly all perished and the race for a time was being propagated to a large extent by those who had escaped death by cowardly flight during the epidemic. The movement known as the Flagellants was in its origin probably only a real penitential impulse on the part of men and women who felt that the sins of mankind had brought down the awful scourge of disease and who hoped to allay the storm of Divine vengeance by due acknowledgment in self-inflicted punishment. After a time, it came to be an hysterical epidemic associated with many abuses and productive of serious evil. Other hysterical manifestations as for instance the Dancing Mania spread throughout Europe and deeply affected the populations of a great many countries. Hecker, the medical historian of the Black Death, has treated these manifestations also, and suggests that after all they represent only a certain exaggeration of reaction to the religious emotions that are common at many times in history. Various curious sects still existing are the testimony to the fact that human nature is not changed and is still quite capable of going to these excesses.

The Black Death produced one other result that was of far-reaching importance. By making labor scarce, it raised laborers' wages and gave an opportunity to secure rights hitherto denied them. Toward the end of the century, Wat Tyler, that is Walter the tiler, led an insurrection in Kent, while Jack Straw led a similar movement in Essex. John Ball, a priest, had been preaching in the open air, the churches being denied to him, against the luxury of the rich and their oppression of the poor, and had produced wide discontent. Wat Tyler led his men to London and London Bridge was shut against them, but they threatened to burn the city and were admitted. Tyler met the young king, Richard II, then only 15 years of age, with a retinue of only some 60 horsemen, and made his demands, one of which was that the king should cut off the heads of all the lawyers in England. When Tyler became insulting, he was struck down by Sir William Walworth, the Mayor of London, and the young king with outstretched hands rode toward the mob of 30,000 who were just preparing to send a flight of arrows, and said, "Tyler was a traitor, I am your King. I will be your Captain." And thus ended the dangerous riot. The leaders of the mob were punished, John Ball was put to death, but the movement which they had set on foot continued to make itself felt and by the end of another century, many of the worst abuses they complained of had been corrected. It takes blood to bring about social changes of any importance; the first martyrs to the cause, or even their generation reap none of the benefits.

The political history of the 14th century is if possible even more full of turmoil than usual. The emperors chosen were usually of no special significance, until it came to be realized that the empire itself had lost prestige and that the man elected to the office must have considerable dominions of his own.

Charles IV, the king of Bohemia, made a good king but a poor emperor, and is remembered for his Golden Bull by which the election of the emperor was regulated but which lessened the imperial powers in favor of the Princes. The English and French became deeply occupied with the Hundred Years' War, not of actual fighting but without lasting peace. The English took Calais and won the battles of Crecy (1346) and Pointiers (1356). King John of Bohemia was killed at Crecy; King John of France was taken prisoner at Poitiers, and became the companion in captivity of David, King of the Scots, the son of Robert Bruce, taken prisoner in 1346. King Edward of England took the title of King of France borne by all the kings of England down to 1800.

The century is famous as the scene of many national legends and heroes whose names have been famous at least among their own people ever since, though modern historians have sadly diminished the authenticity of their exploits. William Wallace, the Scottish chief, was beheaded in 1303, but his brave effort against his country's enemies probably encouraged Bruce in the great enterprise of freeing Scotland. About the same time William Tell inspired the Swiss with a renewal of that love of freedom which has ever since kept their little country independent in the midst of warring Europe. Arnold Winkelried may not have gathered all the Austrian spears into his single devoted breast at the battle of Sempach (1385), but his story has proved a real source of courage. Rienzi, the «Last of the Tribunes,» (1347) attempted to restore the Roman Republic while Artevelde (died 1382) led the revolt of the Flemings for freedom. Apart from these, glorious if sometimes mythical deeds, political history of the time is a dreary period of wars an destruction, political jealousy, dynastic rivalry and corrupt practices. Dante wrote his great poem in exile, and Italy was rent by the struggle of the Guelphs and Ghibellines, though somehow in spite of the disturbances, men found not only the time but the freedom of spirit for the pursuit of great literature and fine scholarship. The Popes left Rome because of political disturbances and transferred their See to Avignon in France. For 70 years, sometimes called the «modern Babylonian Captivity,» the Popes were out of Rome, and it was given over to violent political dissension An earthquake occurred to further disturb the city, and at one time of this century it is said that Rome contained scarcely 10,000 inhabitants.

The end of the century saw the rise of a great conqueror in the East, Tamerlane, who from Tartary set out to conquer the world. He invaded Persia, took Ispahan, and made a pyramid of human skulls of his victims, defeated the Russians and sacked Moscow, invaded India successfully and took Bajazet the Sultan of the Turks prisoner after a great battle just as the next century opened (1402).

The 14th century witnessed the serious division of Christianity known as the Great Schism. This developed after the return of Pope Gregory XI to Rome from Avignon and his death, when Avignon and Rome had claimants to the Papacy. Urban VI was elected at Rome and Robert of Geneva who took the name of Clement VII, elected at Naples, by disaffected Cardinals was driven from there and took up his residence at Avignon. Even the saints of the time were divided in their adhesion. Saint Catherine of Siena and Catherine of Sweden, as well as Blessed Peter of Aragon and Gerard de Groote, the great founder of the Brethren of the Common Life, acknowledged Urban as Pope, while Saint Vincent Ferrar and Saint Collette recognized Clement. Rome and Avignon Popes continued to be elected regularly until the end of the century. A third claimant to the Papacy was elected in Pisa, and it was not until the Council of Constance (1415) deposed one Pope, received the abdication of another, and dismissed a third, that the Schism was ended by the election of Pope Martin V. There are church theologians who argue that none of the claimants of this period were really popes, and that there was a long inter-regnum such as occurs for brief intervals at the death of every pope.

The social sense of the time is very well illustrated by the career of the famous Dick Whittington, as he is so well known from the children's stories with regard to him. He was born just after the middle of the century, shortly before the death of his father, Sir Richard Whittington, who had been declared an outlaw. The boy had to make his way for himself and the old legends depict him as going up to London to seek his fortune in the company of a cat to whom he is kind and the animal repays him by helping him to make his fortune. The part played by the cat has now been all whittled away by the rationalizing folklorists who have pointed out that a similar story is a commonplace in many languages. It is suggested that Dick made his fortune by *achat* or *acat,* that is, commerce or trade, and that in the course of time, the meaning of the word was transferred under the influence of folklore. There is no doubt about his having made his fortune however, and in 1392 he became an alderman and sheriff at London and was chosen mayor in 1397 and several times later. He had no children of his own, and the principal interest of his career is not that he made his fortune, which is the part of the nursery tale emphasized for children, but the noble disposition which he made of it, a portion of his story that has unfortunately not been told to children. It is for this latter reason that he is spoken of as «the model merchant of the Middle Ages.» He rebuilt Saint Bartholomew's Hospital, which had been founded in the 13th century and still continues its good work. He built an almshouse for the aged poor where old married folk might live together till the end of their days, as well as a college and an addition to Saint Thomas' Hospital, Southwark. He made arrangements for a maternity where young women «that hadde done amysse» might be cared for with absolute privacy «in truste of a good mendement» so as to have a chance for reform. Most of this he did before his death, but he left still more generous benefactions in his will, and all of them with the purpose of preventing poverty and suffering rather than merely providing temporary assistance. No wonder that he is known as the «Father of the Poor» and that he is one of the well-known characters of the end of the

Middle Ages. The records of London charities show many like him at this time.

James J. Walsh,
Author of 'The Thirteenth the Greatest of Centuries,' etc.

PRINCIPAL EVENTS OF THE FOURTEENTH CENTURY.

1301–08. Founding of important European universities.
1302. Battle of Courtrai. Flemish democracy's victory over the French.
1303. Edward I of England invades Scotland.
1304. Birth of Petrarch.
1305. First Assembly of the States-General in France. Election of bishops. Regal power made independent of Papal influence. Wallace, the Scottish chief, beheaded in London.
1306. Robert Bruce becomes king and liberator of Scotland.
1307. William Tell appears as the liberator of Switzerland. Coal first used as fuel in England.
1311. Suppression of Knights Templar.
1314. Battle of Bannockburn. The Scots defeat the English under Edward II.
1315. Swiss defeat the Austrians at Morgarten, 15 November.
1321. Civil war in England. Death of Dante.
1326. King Edward II of England dethroned.
1327. Edward III of England commences his reign.
1328. Philip VI of France founds the Valois dynasty. Edward III of England assumes title of King of France.
1331. The art of weaving cloth introduced into England by Flemish artisans.
1338. Froissart, French chronicler and historian, born.
1339. English invade France and the Hundred Year's War begins.
1342. Factions of the Guelphs and Ghibellines in Italy. Rule of the Medici.
1344. Parliament of Paris. Madeira discovered by Portuguese navigators.
1345. Canary Islands discovered.
1346. Battle of Crecy, 26 August. The French defeated by Edward III of England.
1347. Rienzi, the "last of the Roman tribunes," assumes power "in the name of liberty, peace and justice." English capture Calais. Admiralty and Law Courts instituted in England.
1348–51. The Black Plague ravages the world.
1349. English king institutes the moral order of the Knights of the Garter.
1350. Dauphiny gives title to the King of France's heir.
1353. Boccaccio's literary fame commences.
1356. Battle of Poitiers, 19 September. King John of France made prisoner by the English.
1360. Calais ceded to England.
1362. Use of French language abandoned in English law courts for the native tongue. Langland writes his 'Vision of Piers Plowman.'
1368. Revolution in China. Yue-chang or Hong-wu founds the Ming or "Bright" dynasty. Makes Nankin his capital. Receives ambassadors from Persia and Constantinople.
1371. The Stuart dynasty founded in Scotland.
1377. Wickliffe's doctrine condemned in England. Richard II becomes king of England.
1378. Schism begins in the Catholic Church and lasts to 1417.
1381. Tyler's insurrection in England. Bills of exchange first used in England.
1383. Cannon first used by the English governor of Calais.
1384. Wycliffe completes translation of Bible into English. The first English navigation act excludes all exports or imports in foreign vessels.
1386. Swiss defeat the Austrians at Sempach through Winkelried's courage.
1387. The first Lord High Admiral of the English navy appointed.
1388. Scotch invade England and are victorious at Otterburn.
1391. The Pope's power and authority abolished in England by the Parliament.
1396. Chrysoloras appointed professor of Greek at Florence, vitalizes scholarship.
1397. Whittington the "father of the poor" becomes mayor of London.
1399. Rebellion in Ireland.

FOURTH CENTURY. The end of the 3d century saw the revivification of the Roman Empire under Diocletian. He was one of those strong sons of the poor who exemplify so often in history the fact that it is the man himself and not his heredity that counts. His mother was surely a slave, his father a carpenter, and the future emperor was born at Dioclea in Dalmatia, to which he owes his name. He was chosen emperor by the troops and slew with his own hands the Prefect of the Prætorians, the murderer of Numerianus, his predecessor. Diocletian owed his position as emperor to his military talents, but it was his genius as an administrator that has given him a lasting place in history. His reign was most favorable to the prosperity of the empire, and he reformed legal procedure, reorganized the finances, and made himself a patron of literature and the arts and sciences, but just at the beginning of the 4th century he permitted the tenth persecution of the Christians. He is not entirely responsible for this, urged to it by Galerius, whom he had chosen as Cæsar, and he feared the growing power of Christianity over the people as lessening the reverence for the emperor. Eusebius, the Christian historian, tells how much the peaceful early years of Diocletian's reign meant for Christianity and for the vast multitudes that flocked to the religion of Christ, and of the spacious and splendid churches erected to replace the very humble structures with which the Christians had been satisfied before. Eusebius notes that their prosperity had brought with it a falling off in fervor among the Christians, but the bitter persecution braced them up, and undoubtedly did much to put the Christian Church in that condition of fervor which so impressed Constantine a little later.

Diocletian at the age of 59, presented to humanity the unusual spectacle of a man giving up the highest position in the world and having resigned the Imperial dignity in 305 retired to live in peace and obscurity for some eight years near his birthplace. Diocletian had chosen three others, Maximian, who received the title of Augustus, and Constantius Chlorus and Galerius with the titles of Cæsars, to share his sovereignty of the Roman world, some 10 years before his retirement. As might have been expected with all these rivals for the empire, Diocletian's abdication was followed by a period of confusion, during which there were sometimes six emperors and almost continuous warfare. Out of this confusion, Constantine, the son of Constantius Chlorus, who on the death of his father (306) was proclaimed Cæsar by his troops at York, England, emerged as the future emperor of Rome. His first five years as Cæsar were spent in defending his province against the Germans, and then he found himself compelled to defend his rights and those of the empire against Maxentius who claimed sole authority. Constantine led an army of surely less than 100,000 men into Italy, though Maxentius had at least 200,000, and after annihilating a powerful host at Turin, laid siege to Verona, defeated a force coming to the relief of the city, and compelled its surrender. Then with an army reduced to 20,000 men, Constantine, undaunted, marched on Rome. On the way he had his famous vision of the Cross in the heavens with the words around it, «*In hoc signo vinces* —«In this sign thou shalt conquer.» By his instructions his soldiers, all now bearing this emblem upon their shields, though the majority of them were not Christians, went forward with a new courage. They met the army of Maxentius, nearly five times their number, at the Milvian Bridge over the Tiber and defeated them, Maxentius losing his life in the river (312).

From this event dates the absolute freedom of Christianity. Early in 313, by Constantine's

Edict of Milan, Christianity was formally recognized as a religion that his subjects might follow without molestation. He met his colleague, Augustus Licinius, and secured his protection for the Christians in the East. Licinius married Constantine's sister and the peace of the world and the continuance of favorable conditions for Christianity seemed assured, but 10 years later Licinius was tempted into further persecutions of the Christians. Constantine took up their defense, and gained a victory by land at Adrianople and by sea at Chalcedon, and then a little later, defeated his rival's land army at Nicomedia, where Licinius was executed. In 325, Constantine, now the master of the Roman Empire, founded a new capital at Byzantium, which he called New Rome, but which came to be called Constantinople after him. The site for the new capital was chosen with great judgment, on an unrivaled harbor in the Golden Horn, at a spot where the commerce of the East and West naturally meet, united with and yet divided from the Mediterranean by the Bosphorus and from the Black Sea by the Propontus. It was an eminently defensible location which afforded splendid opportunity for the erection of a magnificent city. The solemn inauguration of the new capital did not take place until May 330, when the court and government settled permanently there. The choice of the site for this capital is a significant testimony to the practical genius of Constantine. He immediately proceeded to make the capital as far as possible a rival of old Rome. New public buildings including a senate house, a capitol, forums, circuses, a number of wonderful Christian churches, particularly that of the Holy Apostles, destined to be the burial place of the emperor, were erected, and some of the most beautiful pieces of antique statuary gathered from various parts of the empire, until Constantinople was considered to surpass all the other cities of the time. It was one of the centres of greatest interest in history for the next thousand years and more and has never lost its prestige.

Constantine did not spend much time in his new capital, partly because of his wars on the confines of the empire, but mainly because of his deep interest in making his government stable, his people happier, and to prevent by his presence the abuses which had been so common during the preceding century. Many of his laws show the influence of Christianity. He was the first to prohibit stringently the abduction of girls, to encourage the emancipation of slaves, and he enacted that manumission in the Church should have the same force as before state officials or by will. Constantine was extremely generous in almsgiving and for the adornment of Christian churches. He had a private chapel in his palace in which as Eusebius, a contemporary, tells us, «every day at a fixed hour, he shut himself up as if to assist at the sacred mysteries and commune with God alone, ardently beseeching Him on bended knees for his necessities.» He did not become a Christian until the end of his life, remaining a catechumen himself, although he brought up his children as Christians. This delay in baptism was not an unusual thing among adults, and Constantine retained something of the earlier Roman spirit exemplified so strongly in Diocletian that the emperor should be looked up to almost with worship, and seems to have hesitated about permitting himself to be seen worshipping with others. At the end of his life, however, Constantine, feeling the approach of death, asked for baptism, declaring that following Christ's example, he had desired to receive that sacrament in the waters of the Jordan, but that God had ordained otherwise, and he would no longer delay. In the true spirit of Christian humility, he laid aside the imperial purple to await in the white robe of a neophyte peacefully for the end. The story of Constantine's life is the best contradiction of the assertion that he became a Christian from political motives.

Constantine made it a favorite task to build handsome Christian churches and no less than three in Rome come from him. These are the magnificent basilica of Constantine in the Forum which was to influence so deeply Christian architecture just then coming into prominence, Saint John Lateran and Saint Peter's. The Lateran was for many centuries the home of the Popes until they moved out to the Vatican. This latter was built in connection with the great church of Saint Peter on the site of Nero's Forum where, according to tradition, Saint Peter was put to death. Santa Maria Maggiore, or in English the Church of Saint Mary Major, was built shortly after Constantine's time and is still nearly in the same condition so far as to columns and walls as it was some fifteen hundred years ago in the time of Saint Jerome and Saint Augustine. The ceiling is Renaissance but the church itself gives an excellent idea of how from the time of Constantine magnificent church edifices were erected.

In spite of the unfortunate results which had followed the custom established by Diocletian of nominating a number of rulers, Constantine partitioned the empire among his three sons. Constantinus ruled the West; Constantius the East with Thrace in Europe, and Constans Italy, Africa and Western Illyria. As might have been expected hostilities broke out, in the midst of which two of the brothers perished, and in 353 Constantius was the sole ruling emperor. Attacked by the Persians in the East and the Allemani and the Franks in the West, he led the eastern army himself, but without success; while Julian, his cousin, who had married Helena, the daughter of Constantine the Great, defeated the German tribes in the West. Jealous of this success, the emperor ordered most of Julian's troops to join him in the East against the Persians, but they refused, and proclaimed Julian emperor. Constantius at once set out to put an end to this encroachment upon his power, but died at Tarsus in Silesia.

Julian succeeded to the empire as sole ruler, and felt that the only hope of securing the allegiance of his people was to put an end to Christianity, to reintroduce the old religion, and above all, reinstate the worship of the emperor as divine. Proclaiming himself Pontifex Maximus, he set himself up as supreme in religion as well as the State. Hence his title in history of Julian the Apostate. He did not directly persecute the Christians, though in the course of restoring pagan temples, he injured many churchs. He met at once with firm opposition in Antioch when he attempted to bring back the worship of Apollo to the Laurel Grove of Daphne, turning out of it the buried bones of Christian martyrs. He felt that it was only by grafting on the old Paganism many of the main features of Christianity to which people had grown used, that there could be any success for his campaign. Above all, he saw very clearly that unless the poor were cared for as heartily as by the Christians, and unless pagan sensualism could be repressed and Christian self-control secured, his proposed change of religion would be helpless. Humility and poverty were two Christian virtues that he despised. He said bitter, scornful things of the Galilean and the 12 poor fishermen whom He had selected to convert the world. Julian's anti-Christian program was interrupted by death after only two years of ruling. The Persians, encouraged by their defeat of Constantius, threatened his Eastern frontiers. He led an army against them as far as Ctesiphon, but was forced to retreat and was pursued by mounted enemies with the Parthian habit of attacking the rear guard but retreating as soon as it turned to face them. Julian fought bravely, but having laid aside his breastplate one day because of the heat of the country, an arrow pierced his breast. Realizing that his wound was fatal, he gathered some of the blood in his hand, it is told, and threw it toward heaven with the words: «Thou hast conquered, Galilean.» His successor, Jovian, who reigned less than a year, restored Christianity to its former position in the empire. He preferred to make peace with the Persians, giving them the whole of Mesopotamia as a peace offering. Jovian was succeeded by Valentinian after Sallustius had refused to accept the perilous post. Valentinian was a rough soldier but of sound practical wisdom, who associated with him in the empire Valens, to whom he entrusted the rule of the East, fixing his own capital at Milan. Valens became an Arian, that is a Christian who refused to recognize Christ as God. He persecuted the Christians, and especially Athanasius, Bishop of Alexandria, numbered among the Fathers of the Church, who had to flee from his diocese. Gratian, the son of Valentinian, had the good sense to call Theodosius, the son of a great general of the same name who had well defended the empire in Britain, to be commander-in-chief of the army, and made him Augustus. The empire was gradually being shaken to pieces by barbarian invaders. The Goths had defeated Valens near Adrianople and internal dissensions made it impossible to resist properly. Pretenders to the empire, governors of provinces, set themselves up as tyrants, especially in Gaul and Britain, but under Theodosius, a stable government was secured once more. He well deserves the name of Great accorded him. He was the last emperor who reigned over the whole empire. He left two sons of whom Honorius reigned in the West and Arcadius in the East, after their father's death in 395.

Theodosius is probably better known because of his place in religious history than for his success as a ruler, great as that was. The most memorable incident of his reign is his acceptance of a severe public penance from Saint Ambrose, who refused to allow him to enter the church at Milan because of his having ordered a massacre of some seven thousand citizens of Thessalonica in punishment for a tumult in the city (April 390). He continued during all his life to be on terms of the most intimate relationship with Saint Ambrose, and it is not surprising to find that his laws put an end to the old Olympian religion, so far at least as any open practice of it was concerned. His persecution of it was justified, for it was now being used as a rallying point for the disaffected against his government and by those who hoped to continue to their own advantage the disturbances which had marked preceding reigns. His last victory over paganism organized against him was at Aquilea in September 394. Theodosius entered Rome after this decree, sole master of what had now become a Christian Empire.

The greatest spiritual force of the century was Saint Ambrose, Bishop of Milan, who so deeply influenced the Emperor Theodosius. Through his personality in his immediate environment and through the emperor for the civilized world of the time he helped more than any other factor to give Christianity the supreme place it now came to occupy. With Saint Augustine, Saint John Chrysostom and Saint Athanasius, Ambrose makes the four great Fathers of the Church. Ambrose's life is a touchstone of the social and educational influences of the century. He was born about 340, whether at Treves, Arles or Rheims is not quite sure. His father was Prefect of Gaul, moving from place to place, but died when Ambrose was a boy, so that the future Father of the Church, like Saint Augustine, felt that he owed much to his mother. He was brought up in Rome, studied law and was appointed governor of Liguria and Aemilia with a residence at Milan. He came to be so much respected for his unswerving justice as an official that on the death of the Bishop, much against his own will, he was called by popular acclamation to the episcopal dignity. Only after his election did he receive baptism, and at the age of 35 began his ecclesiastical career. He fulfilled his episcopal duties with fine administrative ability which meant much for the Church and was noted for his tact, yet consistent firmness as is illustrated by his treatment of the Emperor Theodosius. His writings are only his Homilies or sermons as delivered to his people. For them, he has received the title of Father of the Church and they remain a recognized source of the traditional teachings of Christianity.

Another great Churchman of the century, whose name and fame are enduring, was Athanasius (296–373), Bishop of Alexandria. His writings on the Incarnation earned him the title of «Father of Orthodoxy,» and he continues to be the special source of argument and tradition with regard to the divine character of Christ. His relations with Constantine have made him a great historical figure at the time when Christianity was becoming the religion of the Roman Empire, while his persecution by Julian the Apostate and his years of exile give his life a romantic interest. He spent some time at Rome in the house of Marcella and he seems to have had a deep influence on the Roman society of the period. He was the long-suffering witness to the Trinitarian formulas which had been defined at Nicea, and which contain the substance of the Faith of the Christian churches. The Athanasian Creed has continued to be ever since this time the symbol of his teaching. It has been the subject of as much contention as Athanasius himself met with during his lifetime. It may not have been written by him, but came to be accepted as the summary of his position.

This century saw a climax of that form of monasticism in which men live in solitude and usually in some desert spot that secures them from intrusion. The greatest of the Fathers of the Desert, as they are called, was Saint Anthony, who died about the middle of the 4th century and whose life has been preserved for us by Saint Athanasius. There is scarcely a distinguished Christian writer and thinker of this and the next century who did not spend some time at least in solitude. Jerome, Basil, Gregory Nazianzen, Augustine are examples. Besides Anthony, the names of Paul the first hermit, Pacohmeus and Macharius are very well known in Christian literature. Some women are counted among these solitaries, though they are usually penitents, imitating Mary Magdalene's life of penance. Their stories have often been the subject of dramatic and fictional treatment so that their names are not unfamiliar. Thais, Pelagia and Mary of Egypt are the best known. All these solitary lives had a strong influence on their own time and on many subsequent generations.

The rival of Saint Ambrose in religious influence in this century (for though he lived on until 420, 60 years of his life are in the 4th century), is Saint Jerome. His long journeys undertaken for his own education throw an interesting sidelight on the intellectual life of the time. Born in Dalmatia, he went to Rome for his early education, and becoming deeply interested in religious studies, proceeded to Treves, then famous for its theological school. Later, he journeyed to Aquilea because of the educational repute of the city, and then to Antioch to attend the lectures of Appollinaris of Laodicea who had the fame of being the finest exegetical scholar of his time. Then, Jerome, like Basil, seems to have learned the lesson that all is vanity, and went to live as a hermit in the desert not far from Antioch. He was attracted there by the reputation of Saint Gregory Nazianzen, whose intimate friendship he gained in Constantinople. His reputation as a scholar led to his invitation to Rome to act as the counsellor of Pope Damasus. At the death of the Pope wearied by the bitter discussions and personal enmities of the time, Jerome made his way to Bethlehem where he lived for nearly 40 years as a hermit doing the writing that has made him famous ever since. His version of the Scripture into Latin, known as the Vulgate, is still the basis of most Biblical translations. His philological inquiries regarding the text of Genesis *Quæstiones Hebraicæ in Genesim* show very clearly what he might have accomplished in what was then an absolutely new field of study, only that he was much more interested in finding the meaning of the Scriptures rather than writing treatises in textual criticism.

Jerome's name is connected with one of the most interesting chapters in the history of the 4th century because of the fact that under his influence a group of women came into prominence whose names have been famous ever since, for the broadening of woman's sphere in life which they brought about. Three women particularly, Eustochium, Paula and Fabiola, under Jerome's directions, devoted themselves to work that up to this time had been unknown for women. Fabiola represents the social interests, and Eustochium and Paula the intellectual interests of the Christian women of the time. Fabiola, after a rather scandalous experience in which she obtained a divorce according to the Roman law, had married again and thus cut herself off from the Church. After the death of her second husband, she did heroic public penance, and then, under the influence of Saint Jerome, devoted her immense wealth and her personal service to the sick poor, erecting a hospital and consecrating herself particularly to the care of those whose maladies made them avoided by others. No wonder that her funeral (400) was an enthusiastic tribute of the reverence and veneration with which she came to be regarded by the Roman people. Paula and Eustochium, mother and daughter, of a Roman house, related on one side to the Julian gens and on the other to the Scipios and the Gracchi, had welcomed Saint Jerome when he came to Rome. On his return to Palestine, they followed him there, and erected monasteries and a hospice near where Christ was born. Three of the buildings were occupied by nuns under the supervision of Paula, all of them meeting every day in the common oratory for prayer. Meantime Eustochium and Paula, and especially the first named, who knew Latin and Greek and Hebrew very well, helped Saint Jerome in a number of ways. Many of Saint Jerome's commentaries we owe to Eustochium's influence and Saint Jerome acknowledged this by dedicating to her his Commentaries on the Prophets. This was the first organization of women for intellectual work, and is therefore noteworthy. About the same time Hypatia attracted attention at Alexandria for her learning, but unfortunately fell under the fanatical hatred of a Christian mob, and was brutally murdered. Some letters of Synesius, afterward Bishop of Ptolemais, show his admiration for her, and as he consulted her about the construction of an astrolabe, mathematics and astronomy seem to have been her special studies. Very little is known about her and above all her relations with the Prefect Orestes and the influence which that had in bringing down upon her the mob is not well understood. About the same time, there seems to have lived at Alexandria a Christian maiden, Saint Catherine, whose deep learning exercised great influence. She was made the patroness of Christian students, who were accustomed to invoke her before studying, writing or preaching. She was a favorite patroness of Bossuet, and the senior classes of Catholic universities still keep her day, 25 November, as their feastday.

Christianity afforded an opportunity for the exercise of feminine influence in the intellectual and social life which had not been possible before. A whole group of Roman women owed a fine opportunity for the development of what was best in their personalities to Christianity. Eustochium and Paula, already mentioned, left Rome but not because there was not a congenial atmosphere there. Marcella, who is sometimes spoken of as the foundress of the first convent, belonged to one of the noblest families in Rome, whose mother, Albina, had entertained Athanasius many years before when he had been compelled to flee from Alexandria. Marcella having lost her husband a few months after marriage, returned to the seclusion of a country villa and gave herself to ascetic practice. When her grief had moderated somewhat, she opened her palace on the Aventine again and made it a centre for the Christian women of Rome. The picture of the influence exerted socially, especially for the ailing poor and for the intellectual interests of Christianity in this palatial retreat on the Aventine not far from the present Santa Sabina, shows what Christianity could accomplish when allowed to exert its influence untrammeled.

Just as soon as the Christians were no longer the subject of persecution and could with confidence devote themselves to public expressions of their religious feelings, what is now called social service came to be a feature of public life. From earliest Christianity special care of the poor and the ailing had been provided. Deacons and deaconesses had visited the sick, and rooms in the bishop's house had been set aside for the homeless or for those in special need. In the Eastern cities, where there was less disturbance than in the West, public hospitals and refuges began to make their appearance and special buildings were provided for them. A letter of Julian the Apostate reveals his conviction that Christianity could not be displaced, unless the religion of the state would provide like facilities for the charitable care of the poor and needy to those which had sprung up under Christianity (361). The extent of the development of this Christian social service will be best understood from the foundation made by Saint Basil in his diocesan city of Cæsarea in Cappadocia. Basil took very seriously the episcopal obligation of caring for the poor and afflicted. He built a house in the suburbs which gradually became a group of houses, until it came to be called «New Town.» Here there was provision for foundlings in what was called the Brephotrophium; for homeless strangers in a Xenodochium; for the ailing in a Nosocomium; a Gerontrophium for the aged; an Orphanotrophium for orphans and other buildings for physicians and nurses as well as workshops and industrial schools. Basil even had provided an employment bureau where those out of work might meet those who needed labor and there seems even to have been a definite anticipation of what we now call reconstruction work in the training of cripples to special labor which would enable them to support themselves.

Basil's 'Homilies' are full of insistence on the duty of the rich to spend their wealth in a Christian spirit. Indeed, the social obligations of the wealthy were so plainly and forcibly preached by Saint Basil that modern socialists have sometimes claimed him as an early socialist. He was only an expounder of the principles of Christian ethics as to the relations of rich and poor, and his words form the background of Pope Leo XIII's great Encyclical on the relations of Capital and Labor at the end of the 19th century.

Basil himself is a striking type of what Christianity was doing for the intellectual man at this time. Though he had the advantages of a university education at Athens, where one of his teachers was probably Libanius, the best known Sophist of the 4th century, and where among his fellow students were, besides his dear friend Gregory of Nazianzen and Julian, afterward the emperor, known as the Apostate, Basil after his graduation had insisted on living a life of prayer and poverty, even founding a religious community on the family estate at Ammesi. His father, known as Saint Basil the Elder, had spent several years as a hermit and his children, no less than three of whom, Macrina, Basil and Gregory, were afterward honored as saints, three of his sons having become bishops, were all known for their practical piety. Basil attributed some of the highest influences of his life to his sister Macrina. He refused the bishopric at first and after he was made bishop, insisted on living in the most absolute simplicity of life, cultivating, indeed, even in his episcopal home, the austerities which had made him remarkable just after his graduation from Athens when Saint Gregory Nazianzen declared that he was equipped «with all the learning obtainable by the nature of man.»

A very interesting survival from the 4th century is the little independent republic of San Marino in north central Italy. They succeeded in maintaining their independence all during the Middle Ages though not without a hard struggle and were one of the Allied governments, the smallest, in the war with the Central Powers. They still maintain some of the very old customs and have lived in more peace and happiness than the citizens of any state in Europe. Their founder, San Marino, was a Christian missionary, and he left them as their most precious heritage their land «independent of everyone» which he hoped they would not increase. The papal authorities always fostered the little republic, and Pope Pius II (Æneas Silvius Piccolomini) granted them special privileges. This little democracy with its long heritage of tradition finds itself just abreast of the new spirit of democracy in our time.

As Roman power declined toward the end of the 4th century, the outlying provinces were invaded by neighboring barbarians and the first invasion of England took place from the old low Dutch lands by the Elbe and the Weser Rivers. The first tribes who came were Saxons and succeeding invaders from the same locality were called Saxons by the Britons whom they displaced and by the Irish and the Scotch, though after a while the Angles and the Jutes from the same region made their way to England and gained a foothold. The name by which the invaders called themselves was Angles or English, hence the name England. The old Germans called everybody whose language they could not understand Wälsch, a word still used in German for foreigners. This was the name they gave the Britons whom they displaced, who were pushed over into Wales where their descendants still remain, though the Welsh call themselves Cymri. The first English (Anglian) kingdom was that of Kent, founded in 449, and in the next hundred years «the greater part of that land which had been the Roman and Christian province of Britain became the heathen land of the Angles and Saxons.» (Freedman).

In the effort of the Britons to repel these invaders, great fighting was done under one or a series of leaders which formed the basis for the stories of King Arthur so often treated in English literature since. It is more than dubious whether a real character with the traits of the legendary king of that name ever lived but these poetic stories with regard to him have kindled the valor of many generations since.

James J. Walsh,
Author of 'The Thirteenth the Greatest of Centuries,' etc.

PRINCIPAL EVENTS OF THE FOURTH CENTURY.

301. Tenth persecution of the Christians.
305. Abdication of Diocletian, Roman emperor. Six emperors reign.
312. Constantine defeats Maxentius at the Milvian bridge and becomes western Roman emperor.
313. Edict of Milan proclaims full rights to Christians.
323. Constantine's brother-in-law Licinius, emperor of the East, persecutes Christians, is attacked by Constantine, defeated and executed at Nicomedia.
325. Constantine, master of the united empire, founds New Rome, now called after him, Constantinople, and convokes the great Council of Nice.
330. Constantinople made the capital of the empire and Christianity the state religion.
335. The Germans cross the Rhine and drive the Romans out of Spain, France and Portugal.
353. Constantius becomes emperor and is unsuccessful against the Franks. His cousin Julian defeats the German tribes in the west.
360. The Goths, originally from southern Russia, branching into eastern (Ostrogoths) on the Black Sea, and western (Visigoths) in Dacia and Podolia, extend their conquests.
361. Julian the Apostate becomes Roman emperor.
363. The Persian war. Julian killed.
364. The Roman Empire divided between Valentian and Valens.
370. The Saxons invade Gaul and England.
375. The Ostrogoths who had conquered the Vandals of Silesia and Bohemia are expelled by the Huns and Alani, and dislodge the Visigoths, who cross the Danube and settle in Thrace under Roman protection. The Alani inhabiting the Caucasus are partly subdued by the Huns, Asiatic nomads who, driven out of Mongolia by the Chinese, cross the Volga and Don unite with the Alani.
376. The Vandals are driven westward by the Alani.
378. The Visigoths, oppressed by the Roman governors, revolt, defeat the Roman army and kill Emperor Valens.
379. Theodosius the Great reigns.
390. The massacre at Thessalonica.
394. Theodosius reunites the Roman Empire after his victory over paganism at Aquilea.
395. The great migration of nations continues. The Visigoths under Alaric ravage the Peloponnesus. The Roman Empire redivides into Eastern and Western, with Rome and Constantinople as respective capitals.

FOURTH DIMENSION. See Geometry.

FOURTH DISEASE, or DUKE'S DISEASE, an eruptive fever closely akin to measles, German measles or scarlet fever. It was first described as a separate disease by Duke in 1900. Many consider it merely an atypical form of German measles, its incubation period and general symptoms being identical.

FOURTH NERVE, one of the pair of cranial nerves, and the chief motor nerve of the superior oblique muscle of the eye. It originates in a group of cells in the floor of the medulla and runs outward over the superior elevator muscle of the eyelid, and is distributed to the orbital surface of the superior oblique.

FOURTH STATE OF MATTER. See Electron; Matter; Radium.

FOUSSA. See Fossa.

FOVILLE, Alfred de, French political economist: b. Paris 1842; d. 1913. He was educated at the Ecole Polytechnique, Paris, became successively auditor to the Council of State, chief of the Bureau of Statistics, and professor of the school of political science. After 1877 he edited the *Bulletin de statistique et de legislation comparée*. He published 'Mémoire sur les variations des prix au XIX ème siècle' (1872); 'La transformation des moyens de transport et ses consequences économiques et sociales' (1880); 'Atlas de statistique financière' (1889); 'La richesse en France et à l'étranger' (1893); 'L'industrie des transports dans le passé et dans le présent' (1893); 'Les conditions de l'habitation en France' (1899); 'La monnaie' (1907). Consult bibliographical notice by Faure in *Revue politique et parlementaire* (Vol. LXXVIII, Paris 1913).

FOWEY, England, seaport town in Cornwall, on the Fowey, 21 miles west of Plymouth. It is situated in a place noted for its scenic beauty and is a favorite retreat for artists. It has a good harbor and was an important seaport in ancient times. The pilchard fishery is the principal industry and there is a good export trade in iron ore, which is mined nearby. Pop. 2,276.

FOWKE (originally SMITH). Gerard, American archæologist: b. Maysville, Ky., 25 June 1855. In 1885–88 and 1891–93 he was connected with the United States Bureau of Ethnology in surveys and explorations of aboriginal remains in the eastern part of the country. Further research by him includes explorations for the American Museum of Natural History, New York, on the lower portion of the Amur River, Siberia, and on Vancouver's Island, British Columbia; and excavations of the supposed Norse remains in the vicinity of Boston, Mass. Subsequently he explored and investigated the glacial remains and deposits in the valley of the Ohio and since 1911 has been engaged by the Missouri Historical Society. His published writings comprise essays on archæological subjects in the bulletins and reports of the Bureau of Ethnology and elsewhere; also 'Archæological History of Ohio' (1902); and 'Montezuma Mounds' (1905).

FOWL. See Poultry.

FOWL CHOLERA. See Poultry, *Diseases*.

FOWLER, Charles Henry, American Methodist clergyman: b. Burford, Ontario, Canada, 11 Aug. 1837; d. New York, 20 March 1908. He was graduated at Genesee College in 1859 and at the Garrett Biblical Institute in 1861; studied law; was pastor for 11 years in Chicago, Ill.; president of the Northwestern University in 1872–76; and corresponding secretary of the Missionary Society in 1880. He was elected a bishop of the Methodist Episcopal Church in 1884; visited Japan, Korea, and China in 1888; organized the Peking and Nanking universities and organized the first Methodist Episcopal Church in Petrograd, Russia. He was stationed for eight years on the Pacific Coast; founded the Maclay College of Theology in Southern California, and assisted in founding Wesleyan University in Lincoln, Neb. He was sent as a fraternal delegate to the Wesleyan Conference in Great Britain in 1898. He wrote 'Colenso's Fallacies' (1864); 'Missions and World Movements' (1903); 'Missionary Addresses' (1906); 'Addresses on Notable Occasions' (1908); 'Patriotic Orations' (1910).

FOWLER, Frank, American artist: b. Brooklyn, N. Y., 12 July 1852; d. 18 Aug. 1910. He studied at Florence, at Paris with Carolus Duran and in the Beaux-Arts, established a studio at New York in 1880, and became known as a portrait painter. His subjects include

S. J. Tilden, Archbishop Corrigan, C. A. Dana, W. D. Howells and other notabilities. He was elected a National Academician, and has published manuals of art: 'Oil Painting'; 'Drawing in Charcoal and Crayon'; 'Portrait and Figure Painting.'

FOWLER, Harold North, American author: b. Westfield, Mass., 25 Feb. 1859. In 1880 he was graduated at Harvard University and later studied at the universities of Berlin and Bonn. In 1892–93 he was professor of Greek at the University of Texas, and after 1893 held a similar chair in the College for Women at Western Reserve University. After 1906 he was editor-in-chief of the *American Journal of Archæology.* He was president of the American Philological Association in 1912. He published 'History of Ancient Greek Literature' (1902); 'Handbook of Greek Archæology,' with J. R. Wheeler (1909) and editions of Thucydides Book V. Plautus' 'Menæchmi,' Plato in Loeb Classical Library, etc.

FOWLER, Sir John, English civil engineer: b. near Sheffield 1817; d. London, 20 Nov. 1898. In 1844 he was appointed to superintend the construction of the Manchester, Sheffield, and Lincolnshire system, a connected group of railways, and other works of vast extent and complexity. He subsequently was employed on many civil engineering works both in England and elsewhere; but the work with which his name will probably be most lastingly connected is the great bridge across the Forth, of which he was chief engineer, having as his colleague Sir Benjamin Baker. (See Bridge). On its completion in 1890 he was made a baronet.

FOWLER, Orson Squire, American phrenologist: b. Cohocton, Steuben County, N. Y., 11 Oct. 1809; d. Sharon, Conn., 18 Aug. 1887. He was graduated at Amherst College in 1834, and opened a phrenological office in New York in 1835. In 1836 he and his brother Lorenzo wrote and published 'Phrenology Proved, Illustrated and Applied,' and in 1838 issued the first number of the *American Phrenological Journal.* Subsequently he lectured on his specialty and allied subjects in the United States and Canada, and wrote and published numerous books, including 'Self-Culture and Perfection of Character'; 'The Self Instructor in Phrenology'; 'Human Science'; etc.

FOWLER, Thomas, English philosopher: b. Burton-Stather, Lincolnshire, 1 Sept. 1832; d. 1904. He was educated at Merton College, Oxford, and from 1873 to 1889 was professor of logic in the university. Since 1881 he has been president of Corpus Christi College. His published works include 'Elements of Deductive Logic' (1867; 10th ed. 1892); 'Elements of Inductive Logic' (1870; 6th ed. 1892); an edition of Bacon's 'Novum Organum,' with introduction and notes (1878; 2d ed. 1889); a little work on 'Locke' (1880); an edition of Locke's 'Essay on the Conduct of the Understanding' (1881; 3d ed. 1890); 'Francis Bacon' (1881); 'Shaftesbury' (1882); 'Hutcheson' (1882); 'Progressive Morality: an Essay in Ethics' (1884; 2d ed. 1895); 'History of Corpus Christi College, Oxford' (1893); 'Principals of Morals' (Part I, introduction written with J. M. Wilson, 1885; Part II, the body of the work, by Professor Fowler alone, 1887; both in one volume, revised 1894); and 'Popular History of Corpus Christi College' (1898).

FOWLER, William Warde, English ornithologist: b. Somerset 1847. He was educated at Marlborough College and Oxford, and was sub-rector of Lincoln College, Oxford, from 1881–1904. He has published 'A Year With the Birds' (1886); 'Tales of the Birds' (1888); 'Life of Julius Cæsar' (1892); 'The City-State of the Greeks and Romans' (1893); 'Summer Studies of Birds and Books' (1895); 'The Roman Festivals of the Republican Period' (1899); 'More Tales of the Birds' (1902); 'Social Life at Rome in the Age of Cicero' (1909); 'The Religious Experience of the Roman People' (1911).

FOWLER'S SOLUTION. See Arsenic.

FOWLING. See Hunting.

FOX, Charles James, English statesman: b. London, 24 Jan. 1749; d. Chiswick, Surrey, 13 Sept. 1806. He was the son of Henry, 1st Lord Holland, and was educated at Eton and Hertford College, Oxford. His father procured him a seat for the borough of Midhurst in 1768 before he was of legal age, and in 1770 the same interest procured him the office of one of the lords of the admiralty, which post he resigned in 1772, and was appointed a commissioner of the treasury.

After being a supporter of the administration for six years, Fox was ejected owing to a quarrel with Lord North, and was thrown into the ranks of the Opposition. The adoption of the disastrous measures which terminated in the independence of the American colonies enabled him to take this part without opposing any of the policy which he had previously supported. During the whole of this eventful contest he spoke and voted in direct opposition to the ministerial system, and, in conjunction with Burke, Barré, Dunning and other eminent parliamentary leaders, displayed the highest talents both as a statesman and orator. On the final defeat of the administration of Lord North and the accession of that of the Marquis of Rockingham, Fox obtained the office of Secretary of State for Foreign Affairs. But the death of the Marquis of Rockingham suddenly divided the party, and on the Earle of Shelburne becoming first Lord of the Treasury Fox retired and soon after a union took place between his friends and those of Lord North, under the name of the coalition. The temporary success of this party movement served only to render popular disgust the more general; and the dismissal of the coalition excited general satisfaction. Though in the new Parliament Pitt had a decided majority, Fox headed a very strong opposition, and political questions were for some years contested with a display of talent on both sides which the House of Commons had seldom previously exhibited.

In 1790 and 1791 Fox regained a share of popularity by his opposition to war with Spain and Russia, and also by his libel bill, regulating the rights of juries in criminal cases and rendering them judges both of the law and the fact. On the breaking out of the French Revolution he was disposed to regard it as likely to prove extremely beneficial. The contrary views of Burke, and the extraordinary manner in which that ardent politician on that account publicly renounced his friendship, is one of the most striking incidents in parliamentary history.

The opinions formed of this eminent leader as a practical and theoretical statesman have been as various as the shades of party difference. That he was a sincere friend to all the broad and generous principles on the due development of which rest the freedom and best interests of mankind, is not to be doubted, and that they were alloyed by great latitude on the subject of party and political expediency is equally clear. As a powerful and purely argumentative orator he was of the very first class; though as to eloquence and brilliancy he perhaps yielded to Pitt, Burke and Sheridan; nor were his voice and manner prepossessing, though highly forcible. Of his amiability in private life, after making allowance for a dissipated youth, all accounts agree. Friends and foes equally testify to his ingenuous and benign character. As an author, besides some Latin poetry and a Greek dialogue, by which he highly distinguished himself at Eton, and a few numbers of a paper, entitled ‹The Englishman,› he published nothing during his lifetime but ‹A Letter to the Electors of Westminster› (1793). To his nephew, Lord Holland, the world is indebted for his posthumous publication, entitled ‹The History of the Early Part of the Reign of James II.› It is written with unpretending simplicity, but disappointed expectation, and has never been popular. Lord John Russell, ‹Life and Times of C. J. Fox› (1859–66); Wakeman, ‹Life of Charles James Fox› (1890); Trevelyan, ‹Early History of Charles James Fox› (1881).

FOX, George, English religionist, founder of the Society of Friends: b. Drayton, Leicestershire, England, July 1624; d. London, 13 Jan. 1690. He was the son of a weaver in good circumstances. While yet a boy he was distinguished by his gravity and exemplary conduct. When in the 20th year of his age, and for some two or three years afterward, Fox describes himself as having been in a distressed state of mind, but from this condition he was at length delivered by that which he regarded as the voice of God in his soul, directing him to Christ as alone able «to speak to his condition.» Very soon after this he commenced his public ministrations at Dukinfied, Manchester and the neighborhood. In 1646 he ceased to attend church. From the first his preaching seems to have made many converts, mainly from the lower middle class, and excited much opposition. Fox's first imprisonment took place in the year 1649, in consequence of his opposing the preacher in «the great steeple-house at Nottingham,» on a point of doctrine. In 1650 he was imprisoned at Derby under a false charge of blasphemy. One of the committing justices, Bennet, acted with great violence on this occasion, and it was he who on Fox's bidding him «tremble at the word of the Lord» first applied to him and his friends the name of Quakers. Fox lay in prison at Derby for about a year, the time having been lengthened in consequence of his refusal to accept a commission as captain of one of the regiments then being raised by Parliament. To his belief in non-resistance and in the unlawfulness of all war, which prompted this refusal, was added at the same time a clear view of the enormity of the punishment of death for crimes affecting property only, and he exerted himself to save the life of a poor woman then in jail for theft. Within 10 years of Fox's appearance as a preacher, meetings of the Friends were established in most parts of England. At the same time, so actively were they persecuted, that for many years there were seldom less than 1,000 of them in prison. Cromwell, though himself favorable to liberty of conscience, and before whom Fox appeared in 1655, seems to have been unable to curb the excesses of popular hostility launched in all quarters against a sect which denounced all state interference with religion and maintained that the gospel should be preached without fee or reward. His doctrine of «the inner light» rested on one central idea, «God is a spirit, and they that worship Him must worship Him in spirit and in truth.»

About a month after the restoration of Charles II, Fox was committed to Lancaster Castle, «on the charge of being a common disturber of the peace and of endeavoring to make insurrection and embroil the whole kingdom in blood.» After lying in jail some months, a habeas corpus was obtained, and the authorities showed their disbelief of these grave charges by allowing Fox himself, unbailed and unguarded, to convey to London the sheriff's return to the writ. The hopes entertained by the members of the young society that they would be allowed a breathing-time from persecution were dispelled at the commencement of 1661 by the atrocious measures which followed the mad attempt of Venner and his Fifth-Monarchy men. The act empowering magistrates to tender the oaths of allegiance and supremacy to any person whom they thought fit to suspect, also operated with great severity against the Friends; under its provisions Fox was committed to prison at Lancaster in the beginning of 1664, whence he was removed to Scarborough Castle, where he lay till the autumn of 1666. In 1669 Fox married Margaret Fell, who was 10 years his senior and the widow of one of the judges of the Welsh courts, and who proved a faithful coadjutor as well as helpmeet. The year 1670 witnessed the passing of the most stringent of the Conventicle Acts, forbidding under heavy penalties the assembling for religious worship, in any house, of more than four persons besides the family, except according to the usages of the Church of England. Soon after his recovery from a severe illness he sailed for Barbadoes, where he exerted himself greatly in the interests of religion and humanity. It was while in this island that Fox drew up a statement of his own and his friends' belief in all the great doctrines of Christianity — a statement clearly disproving their alleged sympathy with Socinian tenets. After a considerable time spent in Barbadoes, Jamaica and the North American continent, he returned to England in 1673, where further persecutions awaited him. He underwent 14 months' imprisonment in Worcester jail, and was at length liberated by the Court of King's Bench on account of the errors in his indictment. In all, he suffered eight terms of imprisonment. In 1677, in company with Penn and Barclay, who had joined the Society about 10 years before, he paid a visit to Holland and some parts of Germany, where his services seem to have been well received. The last 15 years of his life were tranquil as regards personal molestation, but he continued to be actively engaged in various ways in promoting the welfare of his brethren. Their persecutions continued throughout the reign of Charles II. In the first year of William and Mary was passed the bill which nullified the Conventicle Acts, and allowed the Friends to make a solemn declaration in lieu of taking the oaths, and Fox had the gratification of seeing the public worship of the Society legally recognized before his death. Fox was a mystic and visionary; but there was another side of character; his mind was one of singular penetration, and his 'Journal' is one of the world's most famous books, rich in spiritual insight, in noble simplicity and in moral fibre. In his schemes for the relief of the poor and the education of the people he was far in advance of his age. He typified in his generation that manifestation of the love of God which has been so singularly exemplified in the history of Society of Friends in practical and unostentatious service to the well-being of their fellowmen. (See FRIENDS, SOCIETY OF). His works were issued in three volumes 1694–1700. The best edition was that published in Philadelphia (8 vols.) in 1831. Consult Sewell, 'History of the Quakers'; Lives by Marsh (1848); Janney (1853); Watson (1860); Hodgkin (1897); Wood (1912); Tallack, 'George Fox, the Friends and the Early Baptists' (1868); Bickley, 'George Fox and the Early Quakers' (1884).

FOX, George L., American actor: b. Boston, Mass., 3 July 1825; d. 24 Oct. 1877. He first appeared at the Tremont Street Theatre in the 'Hunter of the Alps'; became known as a low comedian at the National Theatre, New York; was a lieutenant in the Union army at Bull Run, and later became manager of the New Bowery Theatre. Here he gained for himself a distinct position by his burlesque imitations of favorite tragedians of the time, and his pantomimes, the best of which was 'Humpty Dumpty,' in which from 1867 to his retirement in 1876 he appeared as the clown.

FOX, Gustavus Vasa, American naval officer: b. Saugus, Mass., 13 June 1821; d. New York, 29 Oct. 1883. He was appointed to the United States navy in 1838, in which he served till 1856, when he resigned with the rank of lieutenant. He was subsequently appointed assistant secretary of the navy, and held this post till the end of the Civil War. He planned a number of operations for the navy, including the capture of New Orleans; and was sent by the government on the monitor *Maintonomoh* to convey the congratulations of Congress to Alexander II on his escape from assassination. His visit to Russia materially aided the acquisition of Alaska by the United States, and was the longest voyage then made in a monitor.

FOX, Henry Edward, English soldier, brother of Charles James Fox: b. 1755; d. 1811. He was educated at Westminster School and entered the King's Dragoons in 1770. In 1773 he was in command of the Thirty-eighth at Boston. He took part in the battles of Concord, Bunker Hill, Long Island, White Plains, Brandywine and Philadelphia and in 1778 became lieutenant colonel of the 49th Regiment stationed in the West Indies. He returned to England in 1783 and was appointed aide-de-camp to the king. He was commissioned major-general in 1793 and commanded brigades at Roubaix, Mouveaux and Pont-à-Chin. From 1801 to 1803 he was stationed at Minorca, and in the latter year was made commander of the forces in Ireland, where he had to deal with the uprising headed by Robert Emmet. In 1804 he became lieutenant-governor of Gibraltar and in 1806 became ambassador to Naples and commander of the British forces in Sicily. He failed in his mission there and was recalled in 1807, became general in 1808, and in 1811 was appointed governor of Portsmouth.

FOX, John William, American novelist: b. Bourbon County, Ky., 1863. He was graduated from Harvard in 1883. He began life as a journalist, later traveled extensively in the South and Southwest and for some time was engaged in mercantile affairs at Cumberland Gap. He has published 'A Cumberland Vendetta' (1896); 'Hell fer Sartain and Other Stories' (1897); 'A Mountain Europa' (1899); 'The Kentuckians' (1898); 'Crittenden' (1900); 'Blue Grass and Rhododendron' (1901); 'Christmas Eve on Lonesome' (1902); 'The Little Shepherd of Kingdom Come' (1903); 'Following the Sun Flag' (1906); 'Knight of the Cumberland' (1906); 'Trail of the Lonesome Pine' (1908); 'The Heart of the Hills' (1913); 'In Happy Valley' (1917).

FOX, Luke, English navigator: b. Hull, 1586; d. 1635. At an early age he went to sea and rose in due time to the rank of commander. On 30 April 1631 he set out from London to search for a northwest passage to the Orient. He explored the western shore of what we now know as Baffin Land, discovered Cumberland Island and named several headlands along Hudson Strait; northern channel is named in his honor. The account of his explorations, together with a map of the regions, is embodied in the work entitled 'Northwest Fox; or, Fox from the Northwest Passage' (1635; also in publications of the Hakluyt Society with notes by Christy, London 1894).

FOX, SIR William, New Zealand statesman: b. Westoe, Durham, England, 1812; d. 1893. In 1832 he was graduated at Wadham College, Oxford, went to New Zealand in 1842 as agent of the New Zealand Company. He returned to England in 1850 and there presented the claims of the New Zealanders for self-government. Although at first unsuccessful, he persisted and at length secured autonomy for the far-distant colonies. He was prime minister of the colony several times — in 1856, 1861, 1863, 1869–72 and 1873. He secured a lasting peace with the aborigines. His published works include 'The Six Colonies of New Zealand' (1851); 'The War in New Zealand' (1860); 'How New Zealand Got Its Constitution' (1890).

FOX, William Johnson, English orator and political writer: b. near Wrenthaum, England, 1786; d. London, 3 June 1864. A weaver's son, he early showed signs of ability and was picked out to be educated for the Independent ministry. Once ordained, his rationalistic opinions cut him off from all the denominations. He became a radical active in politics, and spoke and

[illegible] the [illegible] Jack- [illegible]

[illegible] New York [illegible] at Britain [illegible] on the New [illegible] was [illegible] Fox entered as [illegible].

FOX, Gustavus V[illegible], American naval officer, b. Saugus, [illegible] 13 June 1821; d. New York [illegible] was appointed to the United States navy [illegible] in which he served till [illegible], when he resigned [illegible] of Lawrence [illegible] assistant secretary [illegible] 1861 he possessed till the end [illegible] planned a [illegible] operations [illegible] the capture of New Orleans, and was sent by the government on the monitor [illegible] to convey the congratulations of Congress to Alexander II on his escape from assassination. His visit to Russia [illegible] was [illegible] the interest [illegible].

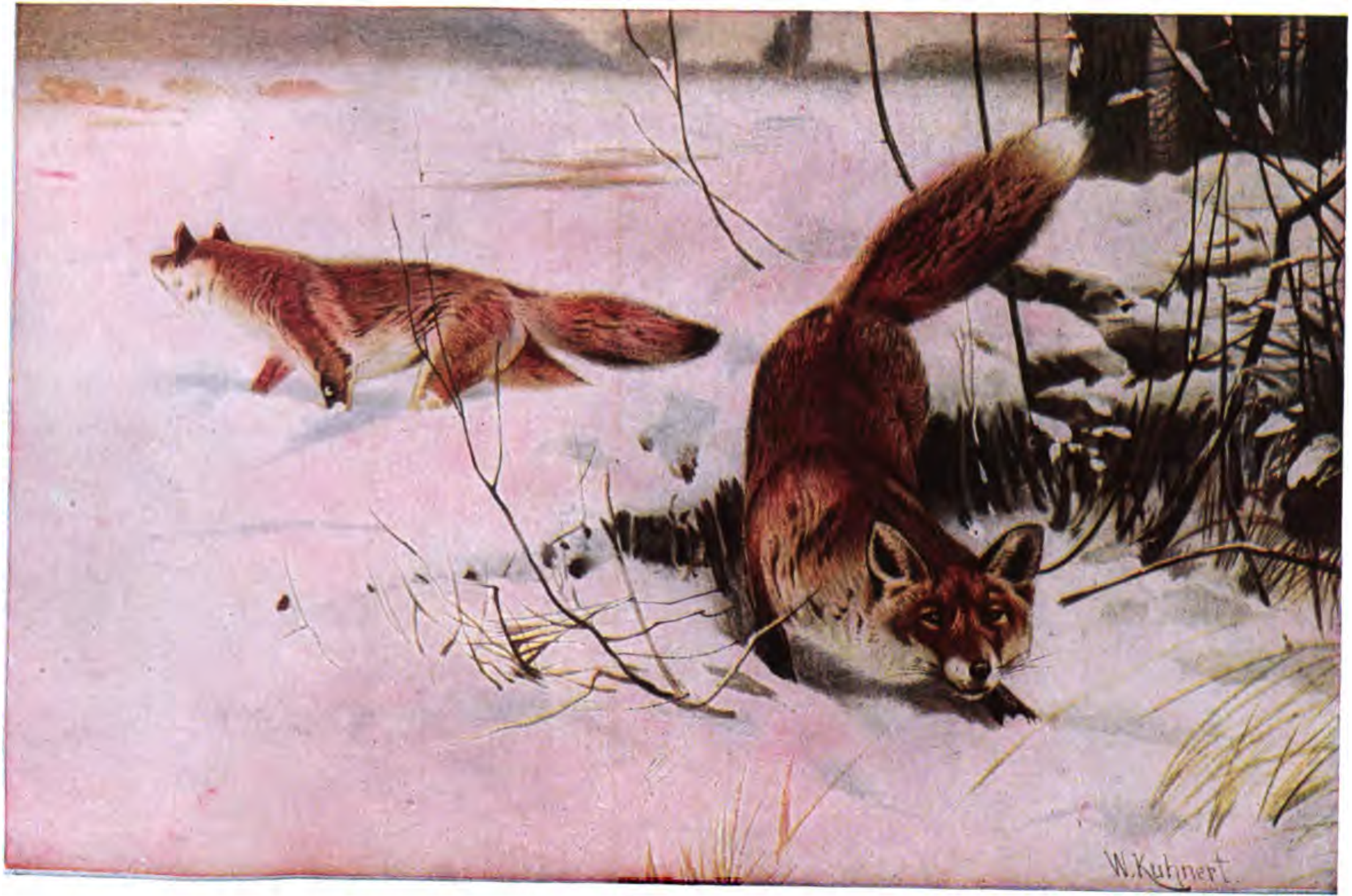
FOX, Henry Edward, English soldier, brother of Charles James Fox; [illegible] d. 1811. He [illegible] Westminster School and educated [illegible] 1773 he was [illegible] Boston. He was present [illegible] and [illegible] 1778 [illegible] in the West Indies. He [illegible] In 1793 he commanded a brigade [illegible] Fort-[illegible] In 1803 he was stationed at [illegible] the [illegible] in Ireland where he had [illegible] the British forces in [illegible] and was [illegible] in 1808, and appointed governor of [illegible].

FOX, John William, American author, b. Bourbon County, Ky., 186[illegible]. He [illegible] 1883. He became a journalist, later [illegible] South [illegible] 'A Cumberland [illegible]' [illegible] 'A Mountain Europa' [illegible] 'The Kentuckians' [illegible] 'The Little Shepherd of Kingdom Come' [illegible] 'The Heart of the Hills' [illegible] 'In Happy Valley' [illegible].

FOX, Luke, English navigator [illegible] On 5[illegible] April 1631 he set out [illegible] search for a northwest passage to [illegible] Land [illegible] Strait, northern [illegible] with a [illegible] Fox from the [illegible] with [illegible] Christ [illegible] London 1635.

FOX, Sir William, New Zealand statesman, b. [illegible] London [illegible] In 1842 he was [illegible] College, Oxford, went to New Zealand [illegible] the New Zealand [illegible] returned to England in 1870 [illegible] settlement [illegible] Although [illegible] he persisted [illegible] colonies [illegible] minister of the colony [illegible] 1856, 1869-72 and [illegible] peace with the [illegible] works [illegible] Zealand [illegible] 'The War in New Zealand' (1866); 'How New Zealand [illegible]' (1890).

FOX, William Johnson, English political writer: b. near Wrentham, [illegible] England, 1 June 1786 [illegible] he early showed [illegible] to be educated for the [illegible] ministry [illegible] his [illegible] active in politics [illegible]



RED FOX

wrote with persistent vehemence against the Common Laws. He was elected to Parliament in 1847, but was twice defeated at subsequent elections. His vigorous pen and eloquent voice aided the cause of popular social and political progress in England at a critical time in her history.

FOX, Williams Carlton, American diplomatist: b. Saint Louis, Mo., 20 May 1855. He first came into prominence as United States consul at Brunswick, Germany (1876–88). Subsequently he was United States vice-consul-general at Teheran, Persia. He organized the American Missionary Hospital during the cholera epidemic there in 1892, and established and edited the only strictly diplomatic and consular journal ever attempted in the United States. He was chief clerk of the Bureau of American Republics 1898–1905, and its director 1905–07. He was appointed Envoy Extraordinary to Ecuador in 1907, remaining in this relation until 1911, when he retired. He was arbitrator in the controversy between the government of Ecuador and the Guayaquil and Quito Railway Company in 1907.

FOX, one of a group of small, long-eared, bushy-tailed animals of the dog-tribe (*Canidæ*), mostly included in the genus *Vulpes;* specifically, in literary usage, the red fox (*V. vulgaris*), called *renard* by the French and *reinicke fuchs* by the Germans. Foxes differ from wolves and jackals in being smaller, having shorter legs, longer, more furry and pointed ears, a more slender elongated muzzle, and a longer and more bushy tail; and they incline to that yellowish red color called «foxy.» But these distinctions are difficult of limitation (see FENNEC; FOXDOG), and some naturalists refuse to recognize a separate genus for them. One fixed character is found in the pupil of the eye, which when contracted becomes elliptical in the foxes but remains round in other dogs. All the typical foxes are inhabitants of northerly latitudes, and well represented by the common red fox, which may be regarded as distributed throughout the whole northern hemisphere, though variously named in different countries, where local diversities exhibit themselves; thus the American variety is called *V. pennsylvanicus,* but it is not essentially different from those of the Old World. Its variations are as great here as in Europe and Asia, especially among those of the Far North, where certain color-phases have superior value in the fur-trade. Thus a fox marked with a dark line along the spine and another over the shoulders, is called a «cross» fox, and fine specimens are worth an extra price. Wholly black ones are uncommon; but the rarest and most valuable pelt is that of a «silver» fox, that is, a black one in which so many hairs are white-tipped that a hoary or silvered appearance is given to the skin. The red fox is fostered for the sport of fox-hunting (q.v.) in Great Britain, and in some parts of Eastern America, but in most countries he is regarded merely as a fur-bearer, or a poultry thief or worse, and is trapped, shot and poisoned continuously. Nevertheless, the animal survives and multiplies in the midst of civilization, by virtue of its power of comprehension of and adaptation to new conditions; so that he has acquired, very justly, a reputation for alertness, wit and cunning in contrivance for food and safety. In America this species is constantly extending its range southward at the expense of the gray fox. Another species yielding a valuable fur is the Arctic or blue fox (*V. lagopus*), which is found on all Arctic coasts, and although brownish in summer, becomes in winter pure white; but the under fur is always bluish, and in those of Alaska this color prevails over brown in summer. Certain of the Aleutian Islands have lately been devoted by local fur companies to rearing these foxes in semi-captivity, where they are cared for, and a selected number annually sacrificed to trade. North America has two other well-marked species. One is the swift or kit fox (*V. velox*) of the plains, which is only 20 inches long, exceedingly swift of foot, expert in digging and cunning at concealment. It has reddish-yellow fur in summer, but becomes dull gray in winter, with black patches each side of the nose. The other species is the gray fox, which was once generally distributed over the United States but has become extinct in the northeastern part since the general clearing and settlement of the country. It is a woodland animal, still numerous in the South and West. Its hair is stiffer and duller in color than that of the red fox and it is so peculiar in structural respects (among others in having a concealed mane of stiff hairs on the top of the tail) that it has been classified in a separate genus as *Urocyon argenteus.* Several well-known species dwell in Asia, the best-known of which is the familiar fox of northern India (*V. bengalensis*).

Foxes everywhere are burrowing animals or else adapt to family needs holes in rocks, hollows of old stumps and similar conveniences. They hide by day and go abroad at night in search of small prey, stalking and catching birds on their nests, or at roost on the ground, ground-squirrels, mice, frogs and insects, and also eating largely of certain roots, fruits and other vegetable food. They are hardy, hunt all winter and climb mountain peaks. They never hunt in packs, as do wolves; and their voice is nearer a bark than a howl. They do not readily submit to domestication, and seem to have contributed little if anything to the composition of domestic breeds of dogs.

Consult for information on Old World foxes, the writings of Bell, Brehm, Blanford, Mivart and Beddard, well-summed up in Lydekker's ‹Royal Natural History› (Vol. I). For American foxes, read Richardson, Hearne, Audubon, Merriam, the writings of Nelson, Turner and Murdoch on the natural history of Alaska, and the general remarks in Cram and Stone's ‹American Animals› (1902).

FOX, or MUSKWAKE INDIANS. See SAC AND FOX INDIANS.

FOX BATS. See FLYING-FOX.

FOX CHANNEL, in the Hudson Bay, Canada, named after Luke Fox, who explored the region in 1631. The channel lies between Southampton Island and Baffin Land.

FOX-DOG, a name given by certain naturalists to the wild dogs of South America, because of their fox-like appearance. Among these are the crab-eating dog (*C. cancrivorous*); the zono, or Azara's dog (*C. azaræ*), of which the «colpeo» of the pampas and southward is probably a local variety; the small-eared Brazilian dog (*C. microtis,* of Mivart), and two other aberrant Brazilian dogs (*C. urosticius,* and *C. parvidens*) for which a separate genus (*Nothocyon*) has been proposed by Wortman. All these animals have a striking external resemblance in color and form to the foxes, and connect them with the typical dogs. They are not well known, however. Consult Mivart in the ‹Proceedings› of the Zoological Society of London (1890); Beddard, ‹Mammalia› (1902), and writers upon the zoology of South America. See BUSH-DOG.

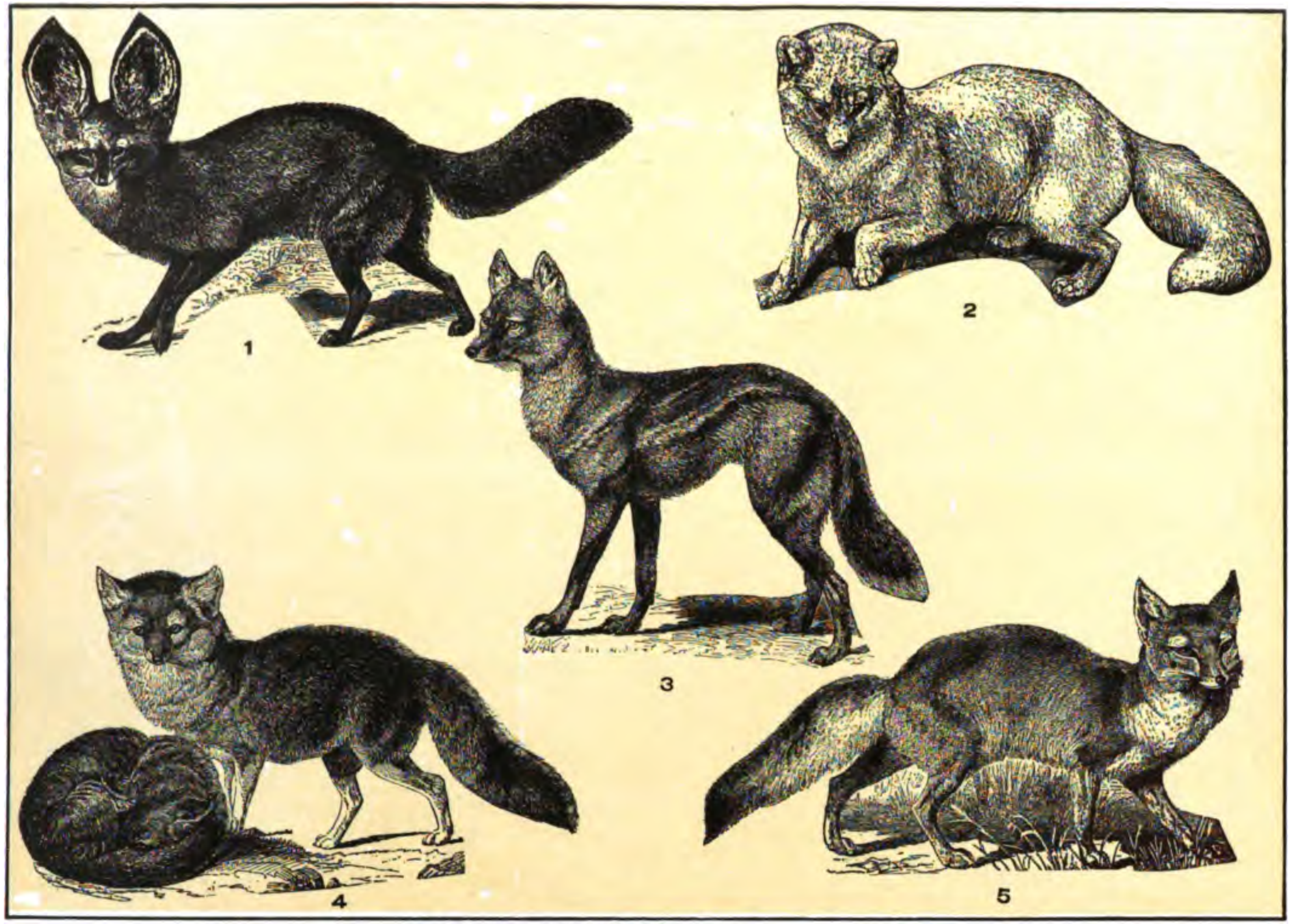
FOX-HOUND, a breed of hounds, concerning whose origin practically nothing is known, save that they were probably first bred in Great Britain. This, perhaps the handsomest and most perfect of all hounds, is essentially a field dog, presenting an eminently powerful, well-built appearance, with his clean-cut, compact body, and giving evidence of muscular strength and endurance in the hunt. The head is full, with a broad brow, a long, wide muzzle, and open nostrils. The ears are set low and lie close to the cheek. The eyes are soft and brown. The chest is broad, and the ribs are deep, so as to afford plenty of breathing space. The muscular body is set on legs as straight as a post, and very strong; and the feet are round and cat-like. The color varies from black to tan and white, and the coat is hard, smooth and glossy. The American breed is lighter and finer in lines than the English fox-hound, has longer, thinner and more pendant ears; a slightly narrower chest, and a rougher coat. He is used in fox-hunting as is the English fox-hound; but is also employed in hunting the moose, and other large game, especially in the Canadian forests. See DOG.

FOX-HUNTING, the chase of the fox with horses and hounds, as a recreation. This sport arose in England with the Restoration, when changes in customs and agricultural conditions caused the disappearance of falconry, and has become surrounded by codes of social usage and of legal enactments. It flourished most in the south-central counties of England, and in Ireland, and some of the principal organizations or «hunts» as the Belvoir, Quorn, Pytchley and Cottesmore, were founded early in the 17th century. A «hunt» is an association for the promotion and regular practice of the sport in a certain district. It acquires a pack or several packs of fox-hounds (q.v.), kennels and perhaps a club-house, is directed by a «master of foxhounds,» and served by paid employees, the principal of whom are the «huntsman» who arranges and leads the sport for the day, and the «whippers-in,» who see that the dogs work properly. These officials, and the sportsmen themselves wear «pink» (that is scarlet) coats when in the field. The expenses are paid theoretically by annual subscriptions, eked out by casual subscriptions for temporary privileges, but usually they must be supplemented by a patron,— probably the «M. F. H.,» who has inherited the dignity and its responsibilities from ancestors who founded the hunt. Anyone may join in the chase, and at Melton Mowbray and other famous «meets» large numbers of outsiders are often present. In these districts foxes are carefully preserved, and the abode and habits of each family of them are studied with reference to the autumnal and winter sport. At the appointed time the hunters, men and women, mounted and accompanied by a pack of from 25 to 40 hounds, are led by the huntsman toward the place where he expects to «find» a fox. There the dogs are loosed, and range about searching for the scent-traces in the air or on the ground left by the recent passage of the animal. When one finds a trail he gives tongue, the others come to his aid and the pack dash away following the scent. With a bugle-signal or cry of «Gone away!» the hunt follows as straight and fast as possible, keeping to roads, lanes and gates where possible, but jumping fence and riding over grain-fields and meadows where needful, the hunt paying such damages as follow. This requires a horse of great speed and leaping power, and has developed the English thoroughbred hunter. When anyone catches sight of the fox he shouts «View! halloa!»; and the ambition of all riders is to keep close to the racing animals and be on the spot, or «in at the death,» when the fox is seized. It is then the duty of the huntsman, or the nearest rider, to save the body of the fox from the dogs, cut off its «brush» (tail), «pads» (feet), and «mask» (head) to be given as trophies to the foremost riders. The remainder of the fox is cut up and given to the dogs on the spot. Instead of running «straight away» and leading a long chase the fox will often take refuge in a drain or other hole, unless it has been «stopped.» This is called «going to earth,» and he must then be ousted by the aid of a fox-terrier.

Fox-hunting has been carried wherever Englishmen have settled, but has found few parts of the world favorable to it. In some countries as on the North American prairies, in California, and also in Argentina, similar methods are adapted to the chase of other animals, as wolves or kangaroos. In the southern and eastern United States, however, where foxes abound, true fox-hunting has flourished ever since colonial days, when each man brought his own hound or hounds to the assembly; and is still pursued by several established clubs in Virginia, Maryland and southern Pennsylvania, where the nature of the country and the agricultural habits of the people favor it. These clubs employ a modified form of hound better adapted to the faster and rougher work required of it than would be the English breed. A special strain, the Magnes hound, has been fostered by the Maryland clubs, the foremost of which is the Elkridge. More nearly conforming to the English models is the establishment and hunting of the Meadowbrook Hunt, on Long Island, N. Y., where, in a level open country, largely occupied by extensive estates and within easy reach of New York, the sport has flourished since about 1876, and is likely to be long maintained. The serious conditions of the great world war, and development of the feeling that it is not altogether manly for a crowd of human beings to chase to the death one small timid animal, have led to a decline in the «sport.»

An extensive literature has grown up about this subject, and many thousands of titles would be required for its bibliography. A good general view may be obtained by reading the volumes devoted to the sport in the English ‹Bad-

FOXES



1 Cape Fox or Lalande's Dog 2 Arctic Fox 3 Side-striped Jackal or Quaha 4 Silver Fox 5 Corsac

minton Library' and in the American 'Sportsman's Library.' Consult also 'Encyclopædia of Sport' (1897).

FOX ISLANDS. See Aleutian Islands.

FOX RIVER, (1) a river of Wisconsin, called by the Indians Neenah. It rises in Marquette County, near the centre of the State, and after a course of about 260 miles passes through Lake Winnebago; it enters the head of Green Bay. A canal has been cut from Fox River to the Wisconsin, which is a navigable affluent of the Mississippi, and the channel of the river below Lake Winnebago has been cleared to admit steamboats from Lake Michigan and Green Bay. A grant of land was made by Congress to assist the work. (2) A river in northeastern Illinois, 100 miles in length, which joins the Illinois River at Ottawa.

FOX SHARK, or **SEA-FOX.** See Thresher.

FOX-SNAKE, a large harmless snake (*Caluber vulpinus*) of the northern Mississippi Valley, light brown in color, marked on the back with small chocolate spots bordered by black, and with a series of smaller spots along the sides and on the yellowish abdomen. It reaches a length of three feet, is irritable and pugnacious, and feeds upon small mammals, especially gophers, mice and other pests of agriculture.

FOX-SPARROW, a large American sparrow (*Passerella iliaca*), notable for its foxy red plumage, and gay song. It is a spring-and fall migrant in the United States, breeding only north of the Saint Lawrence. See Sparrow.

FOX-SQUIRREL, the largest of the true squirrels (*Sciuriss niger.*). These rusty-coated squirrels are denizens of woods. They live in hollow trees or high among the branches, in nests of dry grass, and feed upon fruits, berries, mushrooms and seeds of various trees. They have been hunted until they have become somewhat scarce in the woods north of Virginia; but southward, they are far more numerous. The flesh is esteemed as food — especially in Florida. Though safe from the depredations of preying birds, because of their size and strength, fox-squirrels are attacked by the foxes and wildcats, which kill and eat them.

FOX-TERRIER, a small terrier dog modified from the old-fashioned English white terrier of uncertain origin. It has a dense smooth coat white, with black or black-and-tan markings; and a small black nose; and it generally weighs between 15 and 20 pounds, when in good condition. The fox-terrier has a narrow, tapering face, and small, deep-set eyes, usually gentle, but capable of an expression of keen animation; the jaws are strong and well-shaped; and the V-shaped ears droop forward close to the cheek. The compact little body is set on straight, supple legs, and the tail, usually docked, is carried in a rather jaunty fashion. The dog's appearance is one of alertness; and, though originally bred to run the fox to earth, fox-terriers have, latterly, become popular not only as vermin-destroyers about stables, but as house-dogs,— their cleanly, sprightly and affectionate ways rendering them extremely amiable and entertaining as companions. One variety, the "wire-haired," has a rather long coat, of rather shaggy appearance. In all other points this is like the smooth-coated variety. See Dog.

FOXBOROUGH, Mass., town in Norfolk County, 25 miles southwest of Boston, on the Neponset River, and on the New York, New Haven and Hartford Railroad. It contains the Boyden Public Library, straw-hat manufactories, tire factories, steam-gauge and automobile accessories works, etc. The town owns and operates the water supply system. Pop. 3,863.

FOXE, John, English martyrologist: b. Boston, Lincolnshire, 1516; d. London, April 1587. In 1543 he was elected a fellow of Magdalen College, Oxford. Applying himself to theology with great assiduity, he secretly became a convert to the principles of the Reformation. This tendency being suspected, a charge of heresy followed, and by the judgment of his college he was, in 1545, expelled. In the reign of Mary he went abroad, and gained a livelihood by correcting the press for an eminent printer at Basel, where he laid the first plan of his 'Acts and Monuments of the Church.' On the accession of Elizabeth he returned to his native country, and was received in the most friendly manner by his former pupil, the Duke of Norfolk, who maintained him as long as he lived, and settled a pension on him at his death. Cecil also obtained for him a prebend in the Church of Salisbury. His principal work is the 'History of the Acts and Monuments of the Church' commonly called 'Foxe's Book of Martyrs,' first printed in 1563, in 1 volume folio; reprinted in 1632 and 1641 in 3 volumes folio. In 1684 it had reached the ninth edition.

FOXGLOVE, a genus (*Digitalis*) comprising about 20 species of herbaceous biennials of the natural order *Scrophulariaceæ*. All are characterized by erect stems which support large leaves near the base and terminate in bell-shaped flowers of various colors. They are much used for flower borders.

FOXTAIL GRASS. See Grasses.

FOY, James Joseph, Canadian jurist and statesman: b. Toronto, 22 Feb. 1847. He was educated at Saint Michael's College, Toronto, and at Ushaw, England, studied law on his return to Canada and was called to the bar in 1871. In 1883 he became King's counsel. His sympathies with the Irish Home Rule movement brought about his appointment as delegate to the Irish Nationalist Convention of 1896. Two years later he was elected as a Conservative to the Ontario Legislature, was re-elected in 1902, 1905, 1908 and 1911. In 1905 he became commissioner of crown lands and later in the same year became attorney-general of Ontario. He was delegate to the Federal Conference on Education at London in 1907, to the Ottawa Interprovincial Conferences of 1906, 1910 and 1913.

FOY, fwä, **Maximilien Sebastien,** French military officer: b. Ham, France, 3 Feb. 1775; d. Paris, 28 Nov. 1825. He entered the army at 15, and made his first campaign under Dumouriez in 1792. He received his 15th wound on the field of Waterloo, but refused to quit his post till the close of the engagement. He was afterward employed as inspector-general of infantry; and in 1819 was elected a member of the Chamber of Deputies, where he distinguished himself as an orator, and was a great public favorite.

FOYER, in places of amusement, a room for the informal social gathering of the spectators at intermissions. In some establishments there are separate foyers for the several classes of patrons and one for the performers. The Paris Opera House affords the best examples of all genres. In America, the term usually denotes a lobby at the head of the main stairway, and is also applied in domestic architecture to a kind of entrance hall.

FOYLE, Lough, Ireland, an inlet of the Atlantic Ocean between Donegal and Derry, 16 miles long, one mile wide at the entrance and widening to nine miles further inland. The west side is navigable for vessels of 600 tons which ascend the River Foyle to Derry. Transatlantic steamers call at Moville on the Donegal side, whence their merchandise and passengers are brought to Derry on light draught vessels.

FRA ANGELICO, ăn-gĕl:ē-kō, the common appellation of Fra Giovanni da Fiesole, one of the most celebrated of the early Italian painters: b. Vecchio, 1387; d. Rome, 18 March 1455. He entered the Dominican order in 1407, and was employed by Cosimo de Medici in painting the monastery of Saint Mark and the Church of Saint Annunziata with frescoes. These gained him so much celebrity that Nicholas V invited him to Rome to ornament his private chapel in the Vatican, and offered him the archbishopric of Florence, which was declined. His works were considered unrivaled in finish and in sweetness and harmony of color, and were made the models for religious painters of his own and succeeding generations. Consult Cartwright, ‹The Painters of Florence› (1901).

FRA DIAVOLO, fră dē-ă'vō-lō, real name **MICHELE PEZZA**, Neapolitan brigand: b. Itri, Calabria, 1760; d. 1806. He became a monk, but was expelled on account of misconduct. He then became leader of a troop of brigands. The government set a price upon his head; but when Cardinal Ruffo undertook to compel the French to evacuate Naples, Fra Diavolo was pardoned, was employed by the cardinal, and received a colonel's commission. At the head of his band he harassed the French, took refuge in Calabria after the conquest of Naples by Bonaparte, and incited the people against the French. He fell into their hands at San Severino in 1806, and was executed. His fame has been extended by the opera by Auber of that name.

FRA DIAVOLO, fră dē-ă'vō-lō, opera comique in three acts by Daniel François Esprit Auber (libretto by Scribe) first produced at the Opera Comique in Paris 28 Jan. 1830. The story, which is replete with incidents and cleverly put together, tells of the adventures of the famous and chivalrous bandit, which ends in his final capture and death, but not before he has spread consternation and almost tragedy through the little village group to which the audience is introduced. Auber was the last great representative of opera comique and his artistic alliance with Scribe, probably the most skilful librettist of modern times, contributed to the great success of his career. ‹Fra Diavolo› is typical of the composer's work at its best — full of melodic ease, piquancy and finish. There is also a sureness of dramatic touch and technique that add not a little to the hearer's pleasure. The most familiar numbers are Zerline's romanza «On yonder rock reclining,» and the barcarolle of the first act, Fra Diavolo's serenade «Young Agnes» of the second and his rondeau, «Then since life glides so fast away» in the third. The finale too is dramatic and convincing. A taking atmosphere of humor pervades the entire work and its orchestral dress is distinguished by brilliant and attractive touches.

FRA LIPPO LIPPI. This dramatic monologue by Browning is like his ‹Andrea del Sarto,› at once a revelation of character and a statement of a theory of æsthetics with special application to painting. It consists of about 400 lines of easy, flexible blank-verse, highly colloquial in style. It was written at Rome during the winter of 1853–54 and was published in 1855 in the volume entitled ‹Men and Women.› The monologue is supposed to be spoken by the painter-friar himself as he returns in the dawn of a spring day from one of his amorous adventures in Florence. Taken by the police, he tells his name and pauses for a friendly chat with the captain. How he came to be just what he is, both libertine and painter of the world as he sees it; how as a street gamin he learned to read men's faces; how he was taken into the convent, given leave to paint, painted men and women as they really were, to the confusion and scandal of the friars; how he escaped into a freer atmosphere, and now, as the protégé of the great Cosimo de Medici, paints as he likes, still following the flesh and often in pursuit of a pretty girl — all this bubbles from him as he faces a friendly listener. The character is complete; for all that Lippo is an old libertine, Browning likes him and the reader likes him. The poet took his facts from Vasari's ‹Life,› but if one wishes to see the difference between poetry and prose he need only compare the two accounts. Lippo's ideas about his art Browning has drawn less from Vasari than from a study of the painter's works. Lippo believes in «the value and significance of flesh»; that «this world's no blot for us, Nor blank — it means intensely and means good»; and the philosophy of æsthetics has perhaps never been more tersely put than in these six lines:

> Or say there's beauty with no soul at all —
> (I never saw it — put the case the same —)
> If you get simple beauty and naught else,
> You'll get about the best thing God invents,—
> That's somewhat. And you'll find the soul you have missed,
> Within yourself when you return him thanks.

In its dramatic revelation of character, its swift, graphic suggestions of setting, and its indirect building-up of a theory of art at once characteristic of the speaker and sound in itself, ‹Fra Lippo Lippi› is altogether a masterpiece. It should be read in connection with the same poet's ‹Andrea del Sarto› (q.v.); the joy in life, the rollicking good humor, and the spring-time of the one are in striking contrast with the weary acquiescence of the other. Consult Mrs. Orr, ‹Handbook to Browning›; and Cooke, ‹Guide Book to Browning,› which prints Vasari's life of Lippo, with explanatory notes on the poem.

Marion Tucker.

FRACASTORIO, Girolamo, jē-rō'lā-mō frā-käs-tō'rē-ō, Italian poet and physician: b. Verona 1483; d. Tacassi, 6 Aug. 1553. He was patronized by Cardinal Bembo, to whom he addressed the most celebrated of his works, a Latin poem entitled ‘Syphilidis.’ In the latter part of his life he wrote a poem on the adventures of the patriarch Joseph, but his poetic fire seems then to have been exhausted, and the virtues of the hero were less happily celebrated than the horrors of the disease. Among the moderns who have exercised their talents in the composition of Latin verse, few have obtained higher reputation than Fracastorio.

FRACKLETON, Susan Stuart Goodrich, American artist: b. Milwaukee, Wis., 5 June 1848. She received a private education and became prominent as a ceramic artist. She has won many prizes in American, European, Canadian and Mexican competition; invented a gas-kiln for firing decorated china and glass; and was the founder and first president of the National League of Mineral Painters. In 1901 she received a medal at the Paris Exposition for her exhibit of pottery. She published ‘Tried by Fire,’ a work on china decoration (1885).

FRACKVILLE, Pa., borough in Schuylkill County, 50 miles northeast of Harrisburg, on the Pennsylvania and on the Philadelphia and Reading railroads. Coal mining is the principal occupation of its inhabitants. Pop. 3,118.

FRACTION, a part of any integer (whole number), or unit. For example, «two and a fraction» means two units and that part of a unit which can be distinguished, as one-half, two-fifths and so on. In the fraction ⅓ in arithmetic, or $\frac{a}{b}$ in algebra, the figure 1, or *a*, is the numerator, and 3, or *b*, is the denominator; and they represent that, if a whole number is divided into three or *b* parts, only 1 or *a* part is taken. In the addition of fractions, the fractions must be brought down to the same denominator and their numerators (as expressed in the value of their new denominator) must then be added, when we have one whole fraction. Thus, if we want to add ⅓ and ⅖, we must find the least common multiple of 3 and 5, which is found to be 15; then, as 3 goes 5 times into 15, and 5 goes 3 times into the same number, we multiply the numerators of the different fractions by these respective quotients and then add the two quantities together. Thus, ⅓ added to ⅖ will be equal to $\frac{5}{15}+\frac{6}{15}=\frac{11}{15}$. The true definition of a fraction may be thus summed up: It is the division of its numerator by its denominator; as seven-eighths are equivalent to the whole number 7 divided by 8 — whence a fraction is obtained. Decimal fractions simplify calculations greatly, as they are constructed on the principle of having one common denominator — a multiple of 10; and thus fractions can be added, subtracted and divided without repeating over and over the tedious process of bringing them down to a common denominator.

The familiar form of numeral fraction is termed a «vulgar» fraction and where the numerator is smaller than the denominator, as in ¼, it is a proper fraction, but if the numerator is the larger, as $\frac{11}{4}$ it is an improper fraction. Fractions of fractions are termed compound fractions and where either numerator or denominator is itself a fraction, it is a complex fraction. For decimal fractions, see Decimals. See also Arithmetic.

FRACTIONAL CRYSTALLIZATION. The crystals deposited at different periods during the evaporation or cooling of a liquid complex are not alike in composition, the order in which the different components crystallize being dependent not only on relative solubility but upon the proportions present. That is, while there is a certain so-called «cutectic» mixture from which the components will crystallize simultaneously, all other proportions on continued evaporation or cooling form only crystals of the compound which is present in excess of the eutectic proportions. Thus a solution of more than 23.5 per cent of common salt in water if gradually cooled deposits only crystals of salt, but if the percentage of salt is less than 23.5 the solution deposits only crystals of ice and in each case when the residual liquid contains just 23.5 per cent of salt, the water and salt solidify together. With three or more compounds similar but more complex relations exist.

When the compounds in the liquid are closely similar in crystalline form and have similar chemical formulæ «mixed crystals» form (see Chemical Crystallography) which contain molecules of the different compounds built into the same crystal. In such a case, at successive stage of crystallization the proportion of the more soluble compound is found to increase and advantage of this is taken to concentrate radium and to separate the rare earths of the didymium group. The processes are extremely laborious and may involve hundreds and even thousands of recrystallizations and may be briefly described as follows, the numbers representing the evaporating vessels.

After obtaining the mixed material in solution in the desired solvent this solution is evaporated in vessel one until a crop of crystals of sufficient size has formed. The crystals are filtered from one and placed in two and dissolved; the mother liquor is placed in three; both by evaporation yield new crystals differing in composition from those first obtained.

The contents of two and three are now filtered and the crystals and mother liquor and placed in new vessels. Vessel four, crystals from two; vessel five, mother liquor from two and crystals from three; vessel six, mother liquor from three. These three are made to yield three new crops of crystals, and so on, the number of fractions steadily increasing and the end members of each series differing most.

Fractional crystallization has long been used as a means of purifying compounds and was formerly much used for extracting silver from lead under the name of the Pattinson process, in which the silver-bearing lead is melted, cooled slowly and crystals of lead lower in silver obtained and transferred to another kettle where they are remelted and recrystallized. The mother liquor from the first lot of crystals is higher in silver than the original lead and is again cooled for another crop of crystals. In this way there can be obtained, with a series of crystallizations, essentially pure lead at one end and rich lead carrying $400 to $500 of silver per ton at the other.

It is recognized by the geologists that fractional crystallization is the most general cause of the great differences between rocks formed from the same fused magma and fractional crystallization undoubtedly also explains numerous concentrated deposits of oxides and sulphides in these rocks. The great chemical sediments, common salt, gypsum, anhydrite and, sometimes, salts of potash and magnesium occur in essentially separate beds rather than intermixed because of fractional crystallization during the evaporation of some ancient sea.

Alfred J. Moses,
Professor of Mineralogy, Columbia University.

FRACTIONAL DISTILLATION OF PETROLEUM. See Petroleum.

FRACTURE, a broken bone. Inasmuch as the greatest variety in the nature, extent and complications may be observed, a certain classification of fractures is desirable. Modern surgeons classify them into about seven different categories or groups. Group 1. According to the degree of the fracture they are complete or incomplete or partial. Partial fractures are known as green stick fractures or they may consist of simple bony depressions, as in the bones of the skull, for instance, or simply by crushing of a bone or the separation of a splinter or of an epiphysis at the end of the bones. Group 2. Fractures are described according to the direction taken in the break, as longitudinal, transverse, oblique, crushed or comminuted, impacted fractures, where a part of the bone is jammed into another part. Group 3. The fracture may be classified in terms of its location — shaft, head, upper or lower third, or it may be named in terms of the contiguous structure. Supracondylar, Submalleolar, etc. Group 4. In term of the cause of the fracture. Traumatic, as from a fall, blow or other injury. As in warfare from bullet wounds, smashing from explosions, etc. Muscular violence may cause a fracture at times. In certain pathological states of the nervous system, such as in syphilis (tabes) or in certain chronic diseases of the spinal cord (syringomyelia, chronic poliomyelitis, etc.), spontaneous fractures are known to occur. Group 5. Fractures may be open, when the skin is cut, or they may be closed when there is no external wound. These fractures were usually termed compound or simple fractures respectively, but the terms open and closed are really more descriptive. Group 6. Fractures are still further divided into complicated and uncomplicated. Group 7. Single or mutiple fractures according to the number of fragments.

Thus a fracture may come to be described in a number of terms. A tabetic who may happen to slip while walking may thus have a trophic, traumatic fracture from the fall or from the muscular exertion to right himself. This fracture might be open or closed, single or multiple, comminuted, complicated, transverse and complete. The most diverse and frightful bone injuries arise from the shrapnel wounds of warfare. Inasmuch as there are so many technicalities connected with fractures they call for the most technical management. In a lay article such as this only the simpler type of description will be given, dealing only with such fractures which may call for first aid. A fracture may usually be recognized by the presence of great pain, swelling and loss of function of the part following an accident or injury such as usually may result in breaking a bone. By careful handling of the affected parts, or by the patient himself making movements of the parts, a sort of grating of the broken ends can be felt. This rubbing or crepitus is a valuable sign and when present always indicates the break in the bony structures. Thus pain, swelling or deformity and crepitus are the chief signs of a fracture. A fracture may result, however, without there being evident crepitus. Therefore in all doubtful cases and, in fact in all suspected cases, an X-ray examination should be made a routine procedure. By the incoming of the X-ray technique, the knowledge of fractures has increased enormously. First aid of closed, uncomplicated fractures consists in giving some support to the part until the physician can be summoned. When the wound is open, however, first aid may be of great service in limiting the possibilities of infection. Open fractures are complicated by the cutting of the skin or of the muscular parts. If there is much bleeding, this must be controlled by a tight compress. This can consist of a folded towel which has been placed in boiling water a few moments, or if time is an element, a clean towel can be applied directly to the wound. Blood is one of the best antiseptics until the doctor comes, and it is better to let the blood be on a complicated open fracture than to attempt poor minor surgery by washing. Complicated open fractures should be even more securely supported and prevented from cutting the tissues more during removal by careful bandages and supports.

The individual symptoms are subject to considerable variation so a short description may be of service in further aiding the first aid diagnosis. The pain is apt to be immediate. It is apt to be quite sharp and severe and acute and is distinctly aggravated by the movement of the parts involved. Unless the part is bandaged there is a tendency on the part of the patient to involuntarily move the fragments which causes a certain amount of movement, hence the continuance of the pain. While the pain is usually closely localized, it may follow the course of a nerve trunk which may have been injured by the fragments. There is usually marked local tenderness. A widely-used surgical rule is as follows: When pressure is put on the sides of a bone at some distance from the point of localized tenderness, and it gives rise to pain at the site of tenderness, there usually is a broken bone. Such pressure may be lateral or along the long axis of the bone. Broken bones usually show a deformity of the parts. Careful looking at the affected regions is enough to make a diagnosis in certain localities; thus there is the characteristic silver fork appearance of a broken wrist, and other localities have their characteristic deformities. Crepitation and X-ray examination have been discussed sufficiently. With the widespread facility for X-ray examinations there is no excuse for faulty diagnosis and treatment. . Every fracture should be X-rayed. No doctor should feel satisfied without the valuable information which this can give, and thus be of use to the patient. Every patient should insist upon it. Consult Keen, ‘Surgery’; Stimson, ‘Fractures’; Bryant, ‘Surgery’; Stedman, ‘Reference Handbook, Medical Sciences.’

SMITH ELY JELLIFFE.

FRADENBURGH, Jason Nelson, American Methodist clergyman: b. Gouverneur, N. Y., 4 March 1843. He was graduated from Genesee College, was professor of mathematics in the Genesee Wesleyan Seminary (1868–69), of ancient languages in the Fredonia Normal School (1869–73) and principal of the Mansfield (Pa.) Normal School (1873–75). After pastorates at Cleveland, Ohio, and elsewhere, he was settled in 1896 at Clarion, Pa. He has published ‘Witnesses from the Dust’ (1885); ‘Beauty Crowned’ (1887); ‘Living Religions’ (1888); ‘Departed Gods’ (1891); ‘Fire from Strange Altars’ (1891); ‘Light from Egypt’ (1897); ‘Life's Springtime’ (1900); ‘History of Erie Conference’ (1907); ‘In Memoriam, Henry Harrison Cummings’ (1913).

FRAENKEL, frĕn'kĕl, **Karl,** German bacteriologist: b. Charlottenburg, 1861. He received his education at the universities of Berlin, Heidelberg, Leipzig and Freiburg. In 1885 he was appointed assistant at the Berlin Institute of Hygiene, becoming privatdozent in 1888. Two years later he was made professor at Königsberg, removed to Marburg in 1891 and to Halle four years later. In conjunction with Brieger he demonstrated the proteid character of extra cellular toxins. He succeeded in isolating the *Pneumococcus* and the *Diplococcus lanceolatus* in meningitis. He published ‘Grundriss der Bakterienkunde’ (1886; rev. ed., 1895); ‘Diphtheriebazillen’ (1893); ‘Meningokokkus auf der Conjunctiva’ (1899); ‘Spirillen des Zeckenfiebers’ (1907).

FRAGA, frä'gä, Spain, town in the Province of Huesca, on the Cinca, 15 miles southwest of Lérida. It contains an ancient town hall and an interesting church which was formerly a mosque. Figs and pomegranates are exported in large quantities. Agriculture generally is in a prosperous condition in the neighborhood. In 1149 it was taken from the Moors, who had made it a separate emirate. Pop. 7,418.

FRAGMENTA VATICANA, a roll of legal documents, dating from the 3d century A.D. and preserved in the Vatican Library, Rome.

FRAGONARD, frä-gō-när', **Alexandre Evariste,** French artist and sculptor: b. Grasse 1780; d. Paris 1850. He was the son of Jean Honoré Fragonard and studied with his father and also with David whose historical style he followed. His most notable painting is the ‘Entry of Joan of Arc into Orleans,’ now in the museum at Orleans; a bas-relief in the Palais Bourdon, Paris, is representative of his sculpture. Other paintings, lithographic illustrations and designs by him are in the Louvre.

FRAGONARD, Jean Honoré, French artist: b. Grasse 1732; d. Paris 1806. He was the son of a glover and was destined for a notary's career in Paris, but at 18 his artistic talent was so marked that Boucher suggested technical study with Chardin, later taking him into his own studio to make reproductions from his original paintings. Fragonard won the «Prix de Rome» in 1752 with a painting of ‘Jeroboam sacrificing to the idols,’ although he was not a student of the Academy. From 1752–55 he studied with Van Loo; in 1754 painting ‘Christ washing the feet of the Apostles’ now in Grasse cathedral; and then from 1755–59 availing himself of his prize opportunity for residence and study at the French Academy in Rome under Natoire, his successive masters broadening the scope of his technic. With the abbé of Saint Non he spent a summer vacation at the Villa d'Este, and Fragonard's studies of the beautifully laid out grounds with their art decorations of terraces, temples, grottoes and foundations, were engraved by the abbé for his descriptive works. They laid the foundation of that style of painting which has made Fragonard famous. Before returning to Paris in 1761 he went to Venice where he was greatly impressed by the works of Tiepolo. His ‘Corésus et Callirhöe,’ eulogized by Diderot, bought by the king, and reproduced by the Gobelins tapestry works, gained his admission to the Academy in 1765. Abandoning religious and classical topics, henceforth Fragonard, a joyous spirit and social favorite, devoted himself to those suggestive pictures of high life which depict the pleasure, sentiment, passion and licentiousness of the court of Louis XV in that period of luxury, extravagance and profligacy which culminated in the French Revolution. Their worth is due to the beauty of their setting, their refined technic and delicate coloring. During the Revolution, Fragonard sought refuge with his friend Maubert at Grasse, whose house he decorated with the ‘Roman d'amour de la jeunesse’ (Romance of love and youth), a series of panels originally intended for the villa of Madame du Barry at Louveciènnes They were sold by M. Maubert's heirs in 1898 for $250,000; they were bought by Pierpont Morgan in 1914 and exhibited in New York; in 1915 they became the property of H. C. Frick. Other fine specimens of Fragonard's works are owned by the Rothschild family of London and Paris, notably the small ‘Billet Doux’ canvas bought in Paris in 1905 for $95,000 which gives an idea of the present worth of «Fragonards.» In the Wallace Collection, London, are ‘The Fountain of Love,’ ‘The Fair-haired Child,’ ‘The Schoolmistress,’ and ‘Le Chiffre d'amour’ (The Symbol of Love); among 15 in the Louvre, Paris, are ‘Corésus’; ‘The Bathers’; ‘La Chemise enlevée’ (The Stolen Chemise); ‘The Sleeping Bacchante’; ‘The Shepherd's Hour,’ and ‘Inspiration’; other works, ‘Serment d'amour’ (Pledge of Love); ‘Le Verrou’ (The Bolt); ‘La Culbute’ (The Tumble); etc., are in different museums throughout France. One of the best known by reproduction ‘The Swing,’ and ‘Blind Man's Buff,’ are in the Groult Collection, Paris. In 1769 he married Marie Anne Gérard, his pupil, a talented miniature painter of Grasse, his own native town, and his happy union resulted in beautiful subjects of domestic life, ‘The Happy Mother,’ ‘The Cradle,’ etc. After the Revolution he returned to Paris where he died in neglect and oblivion, appreciation of his work reviving 80 years after his death. Consult the biographies by De Nolhac (Paris 1906); and by Portalis (Paris 1883); also De Goncourt, 'L'Art du XVIIIe siècle' (Paris 1874); Josz 'Fragonard-mœurs du XVIIIe siècle' (Paris 1901).

FRAMINGHAM, Mass., town in Middlesex County, on the Sudbury River, and on the New York, New Haven and Hartford, and the Boston and Albany railroads, about 20 miles west of Boston. It comprises the villages of Framingham, South Framingham, Saxonville and Nobscot. The chief centre of commerce and industry is South Framingham which has manufactures of straw braids and hats, boots, shoes and rubber goods, paper boxes, tags, crêpe paper, leather board, gummed labels, boilers and carriage wheels; while in Saxonville blankets, wool and worked yarn and cloth are manufactured; farming implements, heaters, sugar and coffee machinery are also produced. The United States Census of Manufactures for 1914 showed within the town limits 49 industrial establishments of factory grade, employing 5,150 persons; 3,982 being wage-earners receiving annually a total of $2,257,000 in wages. The capital invested aggregated $9,285,000, and the year's output was valued at $8,727,000; of this, $5,280,000 was the value added by manufacture. Framingham was early known as an educational centre. Framingham Academy, established in 1792, was incorporated in its public school system in 1851. The first State normal school established in the United States is here, removed from Newton in 1853, its first location having been Lexington from 1839–44. At Sherborn adjoining South Framingham is the State reformatory for women. Framingham also contains hospitals, almshouse, Home for the Aged, a public library and its historical and natural history society has notable collections. Municipal waterworks are operated and the administration is by town meetings. Known as Danforth's plantation, the property of Governor Thomas Danforth from 1640, on the Boston to Worcester turnpike, the "old Connecticut path," and named Framingham from his English home, its incorporation as a township dates from 1700. Pop. 13,648. Consult Temple, J. H., 'History of Framingham' (Framingham 1887).

FRAMPTON, Sir George James, English sculptor: b. 1860. He studied under W. S. Frith and entered the Royal Academy schools in 1881, was awarded a gold medal and traveling studentship in 1887, since when he has received many honors in France, Germany, Belgium, Spain and America, including Médaille d'Honneur at the Paris Exposition of 1900. He has executed many memorials and statues, including those of Queen Victoria at Calcutta, Southport, St. Helens, Winnipeg and Leeds. He designed the terra-cotta decoration on the Constitutional Club, the sculpture on the Glasgow Art Galleries, the whole of the sculpture on the exterior of Lloyd's Register, London, the entrance to Electra House, London, spandrels at entrance of the Victoria and Albert Museum, figures on the spire of Saint Mary's, Oxford, saints on the shrine of William of Wykeham, Winchester Cathedral, lions at the entrance to the new exterior of the British Museum, statues of Queen Mary for Victoria Memorial Hall, Calcutta, and Government House, Delhi, portrait busts of George V and Queen Mary for the Guildhall. He has designed and executed works in ivory, silver, enamels, etc. He was knighted in 1908.

FRANC, a French silver coin, containing 10 décimes and 100 centimes. Value in American money 20 cents.

FRANC, fränk, **Martin Le**, French author: b. Normandy 1410; d. 1461. As secretary to the Duke of Savoy who became Pope Felix V he secured several prominent appointments, notably that of secretary to Nicholas V. His chief works, 'L'estrif de fortune et de vertu' (1519), in prose, and his lengthy poem, 'Le champion des dames' (1530), although tedious and burdened with detail, throw valuable light on contemporary manners and customs.

FRANÇAIS, Count Antoine, French politician and author: b. Beaurepaire, Isère, 1756; d. Paris, 7 March 1836. He was elected as representative for the Department of Loire-Inférieure to the Legislative Assembly in 1791, and became notorious for his violent attacks on the priesthood and the farmers-general but did not gain re-election to the Convention. As a Girondist, he fled for safety to the mountains during the Reign of Terror. He was a member and one of the secretaries of the Council of Five Hundred in 1798; became prefect of Charente-Inférieure; member of the Council of State; in 1804 Director-General of Indirect Taxes; was created count and grand officer of the Legion of Honor, and finally peer of France. His published works include 'Le manuscrit de feu M. Jerôme' (1825); 'Judaises composé sur la montagne' (1826); 'La vallée des originaux' (1828); 'La vie rurale, ou l'agriculture enseignée d'une manière dramatique' (1829).

FRANÇAIS, frăṅ-să, **François Louis**, French painter: b. Plombières, department of Vosges, 17 Nov. 1814; d. 1897. He was a pupil of Corot and Gigoux at the Beaux Arts, first exhibited at the Salon in 1837, obtained a medal of the first class at the Salon of 1848, and was admitted a member of the Institute in 1890. He became best known as a landscapist, particularly for his views of the Paris environs and glimpses of the Seine. His finest work, 'Daphnis and Chloë,' is in the Luxembourg, together with three other canvases, 'Evening,' 'Orpheus' and 'The End of Winter.' His style is peculiarly individual in its combination of realism and idealism.

FRANCAVILLA (frăn'kă-vē'yă) **FONTANA**, Italy, city in the province of Lecce, between Brindisi and Taranto. It has manufactures of leather and cloth and an active trade in oil and wine. Pop. 21,527.

FRANCE, frăṅs, **Anatole.** See Thibault, Jacques Anatole.

FRANCE, Joseph, French publicist: b. Lorraine 1787; d. 1869. Having entered the French army in 1815, he had become a colonel in 1834, and in 1836–46 was commander of military police in the island of Martinique, West Indies. The publication of his 'La vérité et des faits' (1841), a work descriptive of the ill-treatment of negro slaves in the island, caused his removal from his post and trial for sedition. He was deprived of his commission, but subsequent to the abolition of slavery in the French colonies (1848) was elected from Martinique to the Constituent Assembly, and from 1852 was a member of the council of the island. His publications include

'Les corsaires français dans les Antilles' (1857); 'Questions coloniales' (1860); 'Statistique de la Martinique' (1861).

FRANCE, the ancient Gallia or Gaul, is the most westerly country of central Europe and the largest republic of that continent. One of the most important of the Latin nations it possesses a history second to none, while its art, literature, and social customs have made it the peer of the foremost nations. Its geography, political and military history since the downfall of the Roman Empire, as also its artistic and commercial life, are here treated under the following heads:

1. Geography, Topography, etc.
2. History, B.C. 58 to A.D. 1796.
3. History from the Revolution to the Establishment of the Empire, 1796–1804.
4. The Empire.
5. History since 1815.
6. The French Government.
7. French Law and Jurisprudence.
8. French Socialism.
9. Socialism in France during the War.
10. French Church and State.
11. The Separation of Church and State.
12. French Education.
13. French language.
14. French Literature.
15. French Dramatic Art.
16. French Music.
17. French Art.
18. French Civilization.
19. French Journalism.
20. French Industries.
21. Commercial and Banking System.
22. French Railways.
23. French Merchant Fleet.
24. French Army.
25. French Navy.
26. French Colonies.
27. France, Diplomatic Relations of the United States with.

1. GEOGRAPHY, TOPOGRAPHY, POLITICAL DIVISIONS, ETC.

France is situated between lat. 42° 20′ and 51° 5′ N.; and long. 4° 52′ W. and 7° 39′ E. (Greenwich). According to the meridian of Paris, the longitude is 7° 7′ 56″ W. and 4° 51′ 46″ E. France is bounded on the north and northwest by the Straits of Dover and the English Channel (La Manche); on the west by the Atlantic, more especially that part of it called the Bay of Biscay; on the south by Spain and the Mediterranean Sea; on the east by Italy, Switzerland and Germany and northeast by Germany, Luxemburg and Belgium. The total land frontier of France is about 1,352 miles, of which about 285 miles faces Belgium, 8 miles Luxemburg, 200 miles on Alsace and Lorraine, 247 miles on Switzerland, 356 miles facing on Spain and 256 miles on Italy. The restoration of Alsace and Lorraine as a result of the European War 1914–18, renewed the ancient boundary line of the Rhine. About 1,872 miles of coast line is distributed as follows: English Channel, 672 miles; Atlantic, 831 miles, Mediterranean, 369 miles. The length of the country from north to south is about 600 miles, and greatest breadth from east to west about 400 miles; to Cape Saint Mathieu, 530 miles. The superficial area of France does not seem to have been definitely determined. The French "official" area is 528,876 square kilometers; the French Ministry of War maps record 536,408 square kilometers; General Strelbitsky, who made a careful survey of the land, arrived at 533,479 square kilometers; while another authority, Dr. von Januschek, made the total 536,464 square kilometers, an estimate that most closely approaches that of the French geographer, Prof. E. Levasseur, who gives 536,460 square kilometers. It must be remembered that the island or "department" of Corsica is included in each calculation.

Geographically, so far as regards peaceful communications, France is more favorably situated than any other country in Europe, since none other has the same easy access from its own coasts to the North Sea, the Atlantic and also the Mediterranean. Her railroads communicate with every country in central and eastern Europe, and all railway traffic to Spain and Portugal must pass through France. Strategically, her position is weak, for, in addition to her three exposed coast lines, France can be attacked on land by five different countries adjoining her borders.

Topography.— Though protected by great natural barriers at most parts where the country is connected with the Continent, France is not enclosed by them. More than half her frontiers face the open seas, and the eastern mountain girdle is open at the gap of the Rhône between the Alps and the Jura; the opening at Belfort; in lower Alsace; and the gorges of the Moselle and Meuse. Her harbors on three shores secure to France a large share in seaborne trade, especially in that most important of all inland seas, the Mediterranean. France is traversed from southwest to northeast by several chains of mountains forming the general watershed of the country. This watershed has two slopes, the one toward the west and north, carrying its waters to the Bay of Biscay, the Atlantic Ocean, the English Channel and the German Ocean; the other toward the east and south, carrying its waters to the Mediterranean. The ranges of mountains and hills forming this watershed include the western and central Pyrenees, the western Corbières in the department of Aude, the Cevennes, the mountains of Vivarais, Lyonnais, Beaujolais and Charollais, the Côte d'Or, the Plateau de Langres, the Faucilles Mountains and the Vosges. This general watershed is met toward the northeast by the eastern mountain ranges of France, namely, the Jura Range and various Alpine ranges, one of the peaks of which is Mont Blanc, which may be regarded as the culminating point of the European mountains, although not absolutely the highest mountain in Europe. Near the centre of France, and separate from the great watershed of the country, are several groups of volcanic mountains known by the general name of the mountains of Auvergne, the chief peaks of which are the Plomb du Cantal in the southernmost group, the Puy de Sancy in the central group and the Puy de Dôme in the northernmost group. The spurs thrown off by the great watershed divide France into six principal basins, five of which are on the northwestern slope and one on the southeastern.

Geology.— France possesses all the geological formations in a greater or less degree of development. The mountains generally have a nucleus of granite, which accordingly forms a prevailing rock in the Alps, on the east frontier, and their branches south to the shores of the Mediterranean, in the Pyrenees, the Cevennes and the elevated plateau of Langres. In the Vosges it is more sparingly developed, its place being often occupied by porphyry; and in the Jura, where limestone occurs in such enormous masses as to have given its name to a peculiar formation. The other crystalline rocks, consisting chiefly of trachytes and basalts, have received a magnificent development in Auvergne, where whole mountains are composed of them, and where the effects of remote volcanic agency are still presented to the eye in extinct craters and lava streams. The granite is overlaid by primitive stratified rocks of gneiss, and of micaceous and argillaceous slates, succeeded, particularly in the Pyrenees, by mountain limestone. The secondary formation, commencing with this limestone and continued in ascending series up to the chalk, always possesses peculiar interest, because within it valuable mines of lead and iron, and all the workable means of coal, are included. It is largely developed in many parts of France, and furnishes a considerable number of coal and mineral fields. The Tertiary formation, including all the limestones, sands and clays, above the chalk, occurs continuously in two great divisions, and partially in a number of isolated spots, and covers a vast extent of surface. The larger continuous division is in the southwest, where it commences at the foot of the Pyrenees, and occupies a very large portion of the basins of the Garonne and of the Adour. The lesser but better known division takes the name of the Paris Basin, and has been made familiar to the scientific world by the labors of Cuvier and other distinguished naturalists.

Rivers and Lakes.— The great rivers of France are the Seine, Garonne, Lôire, Charente, Adour, Meuse and the Rhône. In the basin of the Garonne are its affluents, the Ariège, Tarn, Lot and Dordogne on the right bank, and the Gers on the left bank. To the north of the basin of the Garonne is that of the Loire and its tributaries, the Nièvre and the Maine on the right bank, and the Allier, Loiret, Cher, Indre, Vienne and Sèvre Nantaise on the left. To this basin also belong the secondary basins of the Vilaine and the Blavet. In the basin of the Seine are its tributaries, the Aude, Marne and Oise on the right bank, and the Yonne, Loing, Eure and Rille on the left bank. The secondary basins are that of the Somme in the north and those of the Orne and Oise in the south. In the basin of the Meuse are its tributaries, the Sambre on its left bank, to which is added the secondary basin of the Escaut or Schelde. The basin of the Rhône occupies the whole of the territory of France which lies to the southeast of the great watershed. The tributaries of the Rhône are the Ain, the Saône, the Ardèche and the Gard upon the right bank and the Isère, Drôme and Durance on the left. The secondary basins are those of the Var, Argens and Arc on the east and those of the Tet, Aude and Hérault on the west. France has in all more than 212 navigable streams, with a total navigation of 5,700 miles. The lakes are few in number, and individually limited in extent. The largest, Grand-Lieu, in the department of Loire-Inférieure, covers an area of only 27 square miles, and is altogether devoid of interest. The next largest, Saint Point, in the Jura, does not cover three square miles. Others of still less dimensions become more interesting from their localities in the lofty regions of the Pyrenees, or in the deep hollows of ancient craters in Auvergne.

Climate.— The climate of France is greatly diversified, and cannot be described accurately without dividing it into different regions. With a very limited exception, it lies wholly within the more moderate portion of the temperate zone. France may be divided into four climatic regions according to the different vegetable products which different districts are able to mature. Within the first, and warmest, the olive is successfully cultivated. It forms the southeast part of France, and is chiefly confined to the departments which border on the Mediterranean. The second region is characterized by the general cultivation of maize or Indian corn. The third region reaches north to the extreme limit of the profitable culture of the vine, and may be considered as determined by a line stretching between the mouth of the Loire and the town of Mézières, in the department of Ardennes. All the country beyond this line is included in the fourth region. In the northwest the prevalence of winds from that direction often produces a superfluity of moisture, which manifests itself in mists or in frequent and heavy showers of rain. At the opposite extremity, the southeast, a contrary effect is produced, and a sultry, stifling wind wrinkles up the skin and not infrequently spreads fever in its most malignant form. But it is only to a few exceptional districts that these remarks apply. After allowing for them, more than four-fifths of the surface remains, under an atmosphere remarkable, more especially in its central districts, for salubrity, serenity and brightness.

Fauna and Flora.— The *fauna* of France does not differ materially from that of central, southern and western Europe, the only difference being that more cattle and sheep are found in the north of France, while the stock of horses is rather deficient. Owing to the lack of extensive forest-lands or mountain masses, the range of wild animals is growing smaller. The wolf and wild boar have not yet been extirpated; for the most part they are artificially protected for sport, especially the wolf of Brittany. In the south the silkworm is extensively reared, as also are bees producing the famous Narbonne honey. Fish is taken around the coasts in great abundance, including the tunny, sardines and herrings.

The *flora* is rich and extensive owing to the great differences of climate. The highland *flora* of the Alps and Pyrenees is identical with that of the other Alpine lands. The garden of the country is Provence, in the southeastern corner, where eucalyptus, introduced from Australia, thrives as on native soil, besides olive and mulberry. The produce of the soil is naturally in accordance with the diversity of climatic and physical conditions. Between the weather-beaten flats of the north and the azure coast of the south, almost tropical in vegetation; from the vineyards of the Médoc to the Alpine woods and pastures below the perpetual snows; from the blooming grasses of Normandy to the wild and desolate plateaux of the Causses every type of vegetation or cultivation is represented. The forests yield oak, beech, lime, elm, pine, fir and various types of maple.

Political Divisions.— Before the Revolution of 1789 France was divided into general governments, the number of which has varied at different epochs. Under Francis I, by whom they were instituted, there were nine. Under Henry III there were 12. Under Louis XIV the number was fixed at 32, to which a 33d was added by the acquisition of Corsica, under Louis XV. In 1789, when the love of change became paramount, the provinces were not permitted to escape; and it was then determined that the whole of France, including the island of Corsica, should be parceled out into departments, and each department subdivided successively into arrondissements, cantons and communes, an arrangement which was actually carried out in 1790. This division has since maintained its ground, each department being named after the most important physical feature which it contains. The number of departments was originally 83, but it has been at different times increased and decreased. There are now 86 departments and the "territory of Belfort," a remnant of the department of Haut-Rhin. As the old provinces, though now no longer recognized in legal and other formal documents, continue so familiar to the French themselves and are so frequently mentioned, not only by earlier writers, but in the geographical, historical and statistical works of the present day, a list is here given exhibiting those old provinces and the departments now most nearly corresponding to them, with their respective capitals or "préfectures." The names of the modern departments are nearly all borrowed from the physical geography of the country, above all from the water courses. A knowledge of French geography will readily enable one to locate easily the relative position of the departments.

Provinces	Departments and capitals	Area, square miles,	Population, 1911.
Flandre........	Nord (Lille)...........	2,228	1,961,780
Artois..........	Pas-de-Calais (Arras)...	2,606	1,068,155
Picardie.........	Somme (Amiens).......	2,443	520,161
"	Seine-Inférieure (Rouen)	2,448	877,383
"	Eure (Evreux).........	2,330	323,763
Normandie......	Calvados (Caen).......	2,197	396,318
"	Orne (Alençon).........	2,371	307,433
"	Manche (Saint-Lô).....	2,475	476,119
Bretagne........	Ille-et-Vilaine (Rennes)..	2,697	608,098
"	Côtes-du-Nord (Saint Brieuc).............	2,786	605,523
"	Finistère (Quimper).....	2,729	809,771
"	Morbihan (Vannes).....	2,738	578,400
"	Loire-Inférieure (Nantes)	2,693	669,920
Anjou..........	Maine-et-Loire (Angers).	2,811	508,149
"	Mayenne (Laval).......	1,986	297,732
Maine..........	Sarthe (Le Mans)......	2,410	419,370
Isle-de-France...	Seine-et-Oise (Versailles)	2,184	817,617
" ...	Seine (Paris)...........	185	4,154,042
" ...	Seine-et-Marne (Melun).	2,275	363,561
" ...	Oise (Beauvais)........	2,272	411,028
" ...	Aisne (Laon)...........	2,866	530,226
Champagne.....	Ardennes (Mézières)....	2,027	318,896
"	Marne (Châlons).......	3,167	436,310
"	Aube (Troyes).........	2,326	240,755
"	Haute-Marne (Chaumont).............	2,420	214,765
Lorraine*.......	Meuse (Bar-le-Duc)....	2,408	277,955
"	Meurthe-et-Moselle (Nancy)............	2,036	564,730
"	Vosges (Epinal)........	2,303	433,914
Alsace†........	Territoire de Belfort (Belfort)............	235	101,386
Franche-Comté..	Haute-Saône (Vesoul)...	2,074	257,606
" ..	Doubs (Besançon)......	2,052	299,935
" ..	Jura (Lons-le-Saulnier)..	1,951	252,713
Bourgogne......	Ain (Bourg)............	2,248	342,482
"	Saône-et-Loire (Mâcon).	3,330	604,446
"	Côte-d'Or (Dijon)......	3,391	350,044
"	Yonne (Auxerre).......	2,892	303,889
Lyonnais.......	Loire (Saint Etienne)...	1,852	640,549
"	Rhône (Lyon)..........	1,104	915,581
Dauphiné.......	Isère (Grenoble)........	3,178	555,911
"	Drôme (Valence).......	2,532	290,894
"	Hautes-Alpes (Gap)....	2,178	105,083
Savoie..........	Savoie (Chambéry).....	2,388	247,890
Savoie..........	Haute-Savoie (Annecy)..	1,774	255,137
Comtat-Venaissin	Vaucluse (Avignon).....	1,381	238,656
Provence.......	Bouches-du-Rhône (Marseille)..........	2,025	805,532
"	Var (Draguignan).......	2,333	330,755
"	Basses-Alpes (Digne)....	2,697	107,231
Arrond. de Nice.	Alpes-Maritimes (Nice).	1,443	356,338
Corse...........	Corse (Ajaccio).........	3,367	288,820
Languedoc......	Haute-Loire (Le Puy)...	1,930	303,838
"	Ardèche (Privas).......	2,144	331,801
"	Losère (Mende)........	1,996	122,738
"	Gard (Nîmes)..........	2,270	413,458
"	Hérault (Montpellier)...	2,402	480,484
"	Aude (Carcassonne)....	2,448	300,537
"	Tarn (Albi)............	2,231	324,090
"	Haute-Garonne (Toulouse)...............	2,457	432,126
Roussillon......	Pyrénées-Orientales (Perpignan)..........	1,598	212,986
Comté de Foix..	Ariège (Foix)..........	1,892	198,725
Guyenne et Gascogne.........	Hautes-Pyrénées (Tarbes)...........	1,750	206,105
" ...	Gers (Auch)...........	2,428	221,994
" ...	Tarn-et-Garonne (Montauban)............	1,440	182,587
" ...	Aveyron (Rodez).......	3,385	369,448
" ...	Lot (Cahors)..........	2,017	205,769
" ...	Dordogne (Périgueux)...	3,550	437,432
" ...	Lot-et-Garonne (Agen)..	2,078	268,083
" ...	Gironde (Bordeaux)....	4,140	829,095
" ...	Landes (Mont-de-Marsan)................	3,604	288,902
Béarn..........	Basses-Pyrénées (Pau)..	2,977	433,318
Angoumois......	Charente (Angoulême)..	2,305	347,061
Aunis et Saintonge.........	Charente-Inférieure (La Rochelle)............	2,791	450,871
Poitou..........	Vendée (La Roche-sur-Yon)...............	2,690	438,520
"	Deux-Sèvres (Niort)....	2,337	337,627
"	Vienne (Poitiers).......	2,711	332,276
Touraine.......	Indre-et-Loire (Tours)...	2,377	341,205
Orléanais......	Loir-et-Cher (Blois).....	2,478	271,231
"	Eure-et-Loir (Chartres).	2,291	272,255
"	Loiret (Orléans)........	2,629	364,061
Berry..........	Cher (Bourges).........	2,819	337,810
"	Indre (Châteauroux)....	2,664	287,673
Marche.........	Creuse (Guéret)........	2,163	266,188
Limousin.......	Haute-Vienne (Limoges)	2,119	384,736
"	Corrèze (Tulle).........	2,272	309,646
Auvergne.......	Cantal (Aurillac).......	2,229	223,361
"	Puy-de-Dôme (Clermont-Ferrand).......	3,090	525,916
Bourbonnais....	Allier (Moulins)........	2,848	406,291
Nivernais.......	Nièvre (Nevers)........	2,658	299,312
Totals........................		* 207,054	39,601,509

The following territories have been acquired since 1790:

Territories	Departments
Avignon and Venaissin (including Orange previously acquired).....	Part of Vaucluse
Nice...........................	Alpes-Maritimes
Savoie.........................	Savoie, Haute-Savoie

2. FRENCH HISTORY B.C. 58 TO A.D. 1796.

The quadrilateral of Gaul has possessed a geographical and political unity from prehistoric times and the inhabitants of that quadrilateral have inherited and transmitted certain political, rather than racial, qualities uninterruptedly throughout the historical period. But the first state in which we find them, when the great mass of them were but barbarians, exterior to the civilization of the Mediterranean Basin, was, of course, far different from that strictly organized and disciplined unity which 2,000 years ago and again to-day is associated with the territory in question.

The Gallic tribes were a set of loosely organized clans dependent one upon the other in a sort of semi-feudal organization. It would seem that no one clan ever rose to a complete hegemony over the rest and again that any small or dwindling clan, long before it permitted itself to be absorbed, would seek defense by recommending itself to some superior neighboring clan. The classic instance of such a dependence is the association of the Parisii, who inhabited the neighborhood of Paris, with the large and powerful neighboring clan of Senones, whose capital was Sens on the Yonne higher up the Seine Valley. It is curious to note that ecclesiastical arrangements, always the most conservative of institutions, preserved a relic of this relation as late as the early 17th century, for until the see of Paris was raised to an archbishopric in 1622 the bishops of Paris were suffragan to the archbishops of Sens.

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*† As a result of the Franco-Prussian War (q.v.) of 1870-71, 3,202 square miles in the departments of Moselle, Meurthe and Vosges, from the ancient provinces of Lorraine, and 2,403 square miles from the former province of Alsace, comprising the departments of Bas-Rhin (capital Strassburg) and Haut-Rhin (capital Colmar), were ceded to Germany. The European War of 1914-18 restored the lost territory to France, readjusted its area to a total of 212,659 square miles, and its population by 1,874,014 (Alsace-Lorraine) to 41,475,523.

The languages spoken by these clans we know little of. We know that the civilized observers of antiquity regarded Gaul as presenting three very clearly marked divisions, which the Romans called (going from east to west), Belgic, Celtic and Aquitanian Gaul. It has been conjectured that the tribes of the first spoke a variety of Teutonic dialects. It may be asserted without fear of error that those of the second spoke a variety of Celtic. As to the Aquitanian or southwestern portions, some will have it that the Basque language once extended throughout its territory; others that its original language was Celtic like that of the central portion. On all this nothing can be certainly known. As to the origins of this stock we are again in complete ignorance and it would be idle to linger upon the many conjectures of migrations on an «Aryan race» (the very existence of which is but an hypothesis) or of a «Mediterranean race,» a piece of pedantry converse to and only one degree less futile than the last.

The inhabitants of Gaul have in common from the earliest times a national character and a religion which, though they may have sprung from 20 different remote racial sources, gave them a common aspect. This character, which is dealt with under French Civilization, may chiefly be defined as military. In the earliest, as in the latest, of European history, the Gaul appears marching eastward in quest of military adventure. The religion professed by these people is a more precise matter. It was of a definite and highly organized kind, although its mysteries specifically forebade its propagation by anything but oral tradition. It had for its organs a hierarchy of priests known as druids, and professed, as Gaul has always professed in a manner which seems a necessity to her people, specific dogmas the adherence to which was guaranteed by penalty and the expression of which was exclusively confined to the priestly caste. Among these dogmas the immortality of the soul, the necessity for sacrifice and, we may presume, a universal God, were prominent. A sacrament of bread and wine distinguished this cult and a ritual holiness attached to certain objects and shrines, as the mistletoe among vegetables and the Grotto of Chartres among places.

The reader must here note the surprising continuity of French institutions, a continuity the like of which is not to be discovered in any other part of the Western world. Indeed it would seem as though the prodigious revolutions in philosophy which in ancient times made Gaul Christian, and in modern times have moved her to a great though perilous experiment in democracy, did little but recolor the substantial framework of the nation, and that under every régime national unity, a priestly caste, affirmed dogma and the sanctity of special shrines distinguished the nature of this people.

From very early times the shore where the Gallic quadrilateral touches the Mediterranean had been colonized by the merchants of the East Greek and Semitic; and indeed the aspect of this fringe, its climate and produce, apart from its exceptionally political history, differentiated it from the rest of the country. Again, the Gallic hordes had overflowed the Alps and largely occupied the valley of the Po. Again, there were presumably spots (as the Plain of Alsace) where the quadrilateral was intercepted by invaders of another stock. But as we have seen in the preliminary essay, the quadrilateral of Gaul is the permanent habitation of the population with the history of which these notes deal, and that population first attains historical importance with the invasion and conquest of Julius Cæsar. This conquest occupied eight years, from 58 to 50 B.C. It was marked by many vicissitudes, the climax of which was the great revolt of Vercingetorix, which was finally crushed at Alesia. Had Cæsar failed in this attempt one cannot say that the Roman power would have been diminished or that of the Gauls extended; it was fundamentally never more than a struggle between civilization and barbarism, corresponding to the struggle undertaken later less thoroughly and with less success by Charlemagne against the Germanic tribes.

As it was, the conquest of Gaul affords such a field for the extension of civilization as has never before or since been afforded to its extension in the history of the Western world. For, first, the «Hinterland» thus acquired was in every way suited to the extension of civilizing power, with a perfect climate, a very fertile soil, a numerous and highly intelligent population; secondly, by an accident without which the Roman Empire could never have come into existence, the Gaul was not only suited to the reception of Roman civilization, but avid of it. Within three generations of Cæsar's great experiment, the whole vast territory was Roman, and more thoroughly penetrated by Roman laws, tongue, feelings and manner than any alien territory has been before or since, with the habits of the conqueror.

Indeed there are but two examples in all history of a success of this kind: that of the Spaniards in the New World, and this of the Romans in Gaul. But the Spanish success, remarkable as it is, does not compare with the Romanization of France. It has achieved a less complete civilization; it was effected at too great a distance from the metropolis.

Other military adventures of this sort have either spread a language or veneered a district with a governing class, without fundamentally changing its daily customs. Such was the Hellenic conquest of the Near East and such was the Roman conquest of northern Africa, in neither of which were the local dialects extinguished or the local religions uprooted. As for the commercial empires, the Carthaginian, the Venetian or the English, it is not in their genius to impose their will upon subject peoples or to transform these into something after their own image; nor have they commonly made the error of attempting a task so uncongenial to their forces.

This Romanization of Gaul, the most complete, and, in a manner, the most miraculous of historical revolutions, endures in its effect plainly to the present day, and upon it more than upon any other one historical phenomenon, the pattern of western Europe has been based: its bishoprics, its ritual, its law, its philosophy and its social organization. The municipality, with its elected council, European kingship, the legal class, the village with its lord and its prædial serfs — all these proceed from the Romanized town and the Roman agricultural estate, not so much as they appear in their original Italian, but rather as they appear in their later Gallic form.

Some 200 years after the Roman pacification was complete, the preaching of the Christian religion in Gaul began to achieve its remarkable success. Legend, and even to some extent recorded history, shows us the leaven of this new philosophy at work much earlier; thus the famous martyrdom at Lyons took place as early as the middle of the 2d century, and the saints who there suffered were, through Irenæus their priest, in touch with the apostolic period, for Irenæus was the disciple of Polycarp, and Polycarp of Saint John. But it was from the middle of the 3d to the middle of the 4th century that the true revolution in Gallic thought as distinguished from these sporadic origins was effected. And from the middle of the 4th century Gaul becomes, as it has since remained, the chief scene of the struggle between the Faith and its opponents.

The Monastic Institution, Eastern in origin, was then established by the efforts of Saint Martin in the West, to produce, after centuries, the university upon one hand and upon the other the representative system. Again, it was then in the middle of the 4th century that the municipalities identical with the sees of the bishops begin to take on a social importance which has made them ever since pivots upon which French development has turned. And it is significant that about the same time the old tribal names of districts reappear, attached to these municipalities. By far the greater part of French towns to-day bear, not their Roman, but their second tribal name.

Coincident with the conversion of Gaul and its organization as a complex and highly efficient clerical hierarchy (which beginning in the 4th century, became within a hundred years the framework of the whole community and the only structure capable of outlasting the dissolution of the Roman world) came the phenomenon loosely and accurately called "the invasion of the Barbarians."

There was in fact but one true invasion, and that, to the honor of Europe, was utterly defeated. It was the Mongolian invasion under Attila. Even this was provoked by the use of Mongolian soldiers in the Roman armies. He penetrated with his enormous host to within sight of the walls of Orleans, fell back to the great dusty plains north and east of Chalons — probably much where the camp now stands. He had with him and was joined by every element of disorder and of chaos: German tribes, and, we may presume, the fugitive, the criminal and the broken men of that declining period. Opposed to them were all the forces of order and they were victorious. But it was the last organized effort of Rome, and within 50 years a local chieftain was to assume power in northern Gaul without so much as assuming the titles of Roman officialdom.

The wealthier and the more self-conscious the Roman Empire grew, the more defined its social opportunities, the more ancient and fixed its customs and the more beneficent the religion which its civilization had to offer, the more did it attract the perpetual infiltration of barbarians from beyond the pale. The process may be compared to the increase of potential which is created by the storing up of a head of water, or any other contrast of positive with negative in physical forces. With every succeeding generation there was less and less temptation or need for the Roman to seek adventure outside the Roman pale. The towns were growing in magnitude, the Roman order had existed so long and with such splendid success as to be apparently eternal. Conversely, there was not a barbarian within a month's march of the border who was not by an irrestible gravitation drawn toward the enjoyment of such privileges. Some small proportion of the more abject savages were attracted by the mere opportunity to loot. These were easily defeated, though a watch against them was a constant care and harassment. They included the few pirates of the North Sea and the cannibal inhabitants of Scotland. The vast majority of the barbarians were not of this kind. They were men thoroughly acquainted with the advantages of Roman citizenship, men many of whom (in the case of some groups the majority of whom) had served in the Roman armies and who desired the privilege of being Roman rather than the fruits of destroying the only civilization they could conceive. Moreover, the total number was small, and especially small were the numbers of those who achieved political success. First of these in the history of Gaul come the Salian tribe of whose confederation was that limited and fairly definite race which still inhabits the district immediately to the north and west of the Waloon belt of French and Belgian Flanders. The social and even the military organization of northern Gaul was in dissolution when in 481 a lad whom history calls Clovis and whose actual name may have been spelled in any one of 20 barbaric fashions inherited the leadership of this little clan. Five years later as a boy of 20 he led them across the border, defeated another body of barbarians, organized as Roman soldiery, and through the organization of the Church,— notably of the great see of Rheims, was permitted to occupy executive rank. It must not be imagined that this, more than any other of the numerous small incursions of the time, violently struck the imagination of contemporaries, still less that it affected the general life of the people. Writs were issued, taxes collected, civil and religious ceremonies performed in the same way, whether the man nominally at the head of the executive in a province or a district happened to have been born within or without the Roman pale. For quite two centuries this distinction had been of little importance. The new features accompanying the end of the 5th and the beginning of the 6th centuries were, merely, first, the advent of a certain though small number of independent warriors who could not be fitted into any known part of the Roman organization (and who were not technically legionaries nor technically Roman officials), and, secondly, the breakdown of the provincial system. City, in the lack of a central power, stood apart from city, each looking to its own affairs. And any petty chieftain, such as Clovis was, would claim to gather taxes, issue writs, enjoy the luxury of the palace, not as the governor of one definite traditional district, but of just so many municipalities as he had troops under him to occupy. It goes without saying that these newcomers at once accepted the religion of the civilization they found as they did every other of its habits. There was however, one feature, which seems to us of supreme importance, and which the Roman civilization of that date seems to have regarded with indifference: this was the feature of popular language. Semitic dialects lingered unmolested in northern Africa at this time. And it was a matter of regret to no one or even of curiosity to the learned, whether such a man as Clovis or Theodoric could or could not express himself in Latin. Latin was the only possible tongue for the work of government, for the law courts and for literature. A thousand dialects, Celtic in Britain, Iberian in the Pyrenees, Teutonic in the Rhine Valley, Punic in Africa, which diversified popular speech, played no greater part in the life of the time than private tastes in reading or in cooking do today. Yet the existence of such dialects has warped and distorted the history, especially of Gaul, in that many historians of imperfect information, reading every sentiment of their own time into the past, have seen in language the test of a society and as we shall discover in a moment, have even made of such a figure as Charlemagne a sort of modern German nobleman.

In this Gaul then, which remained as purely Roman as before, with no perceptible admixture of new blood and with no change in the methods of government save a gradual weakening and coarsening of them, Clovis established himself in executive power over the municipalities of the north and east; having, that is, the right to issue writs in his name, to gather the dwindling taxes and to reserve for his part the luxuries and the honors traditionally incident to the position of a Roman official. For more than a century, till the advent in 628 of Dagobert, the great-great-grandson of Clovis, this local executive power is as vague and changeable as can be. It depends upon personal prowess in battle. Now the petty kinglet in the north stretching his nominal power almost to the Pyrenees; now the whole territory is divided among brothers; now there is an alliance with other Teutonic chieftains of the Burgundian or Visigoths in other parts of the territory; now for a moment the whole is united again in one hand. Save as concerned landmarks, the lives of these kings are unimportant. The social fact underlying the whole business is the dissolution of one portion of the Roman organization and the survival of another. The portion which dissolved and whose instruments of power became first nominal, then merely legendary, was the central authority and the army upon which it had reposed. The portion which survived and which even increased in strength as the darkness of the time deepened was the municipality and above all the clerical organization based upon the municipality.

Meanwhile, like any great body that has gone through a sharp readjustment of conditions, the western districts of the Roman Empire by the 7th century began to organize a new and a debased but yet a stable life. The conditions were these: Britain had been for more than a hundred years quite cut off from the Roman world and the Eastern half of it nearly ruined by pirates. Africa had been overrun by every sort of wastrel, escaped slaves, nomads of the desert, starving peasants and criminals, gathered round a small nucleus of wandering Teutonic barbarians called Vandals. It had been temporarily regained by the Imperial power, but was never again the orderly and civilized province which it had been for 700 years and was destined in the next century to be permanently effaced by the Arab invasion. In Spain and in Gaul the Roman municipality endured and little bands of Teutonic raiders had established their chieftains as nominal heads of the executive power. Men had settled down to this conception of the world as to the obliteration of the old central authority; they were long used to seeing upon their parchments the curious names of Germanic origin which had replaced those of the emperors. Letters and arts had so declined that the past had become a fixed standard of excellence, the attainment of which was despaired, when the ruins of the old Roman order began to group themselves again into something of a stable (though of a coarsened and much lowered) civilization which is generally called that of the Dark Ages. And by an historic accident this civilization was nowhere fully preserved save in Gaul.

This accident was the successful Mohammedan invasion of Spain, a catastrophe which left Gaul the only intact Christian unit, and therefore the only seed plot in which the tradition of civilization could hold its own and be preserved.

Britain was hardly yet rechristianized and civilization had but just begun to strike its new roots. Theodore had but just organized the Church in that island and it was still a mass of little warring districts, when Taric landed upon the shore which still retains his name under the Rock of Gibraltar, in 711. In two years the Mohammedans were at the foot of the Pyrenees, and the whole intervening plateau with its Roman municipalities, its organized hierarchy, its European traditions of 900 years, was subject to the Asiatic.

The consequences of this disaster were enormous. The western Mediterranean, the common highway by which Roman influence has welded all Western Christianity together, was henceforward Mohammedan. Its islands were open to perpetual invasion, many of them to regular occupation (the Balearics were not recovered by Christendom for over 500 years!); every seaport which had escaped actual conquest was open to perpetual insult; Italy, already a mass of independent localities, now lay, as to its southern half, open to influences the most antagonistic to those of Rome; Rome itself might henceforward almost be called a frontier town; the balance of the great provincial system was destroyed and a general observer of history who should not be acquainted with what was to follow might imagine that after this blow Christian civilization and all the traditions of Rome and the West could not but perish. As a fact, by a process with which this paper has not to deal, the indomitable energy of the Spaniard reconquered the Iberian province and slowly re-established the civilization which we now enjoy. The debt we owe to the crusading spirit of Spain is not calculable; but for it there would not to-day be what we call Europe; its learning and its religion would have perished. As it was, for many hundred years, with Britain hardly civilized, Spain lost and Italy distracted, Gaul remained to the close of the Dark Ages the one intact remnant of Europe.

Meanwhile there had been proceeding in Gaul itself a transformation in the nature of political authority which was destined to have very wide-reaching effects. The spirit of the municipalities, organized and aided by the bishops, had restored a conception of national unity, and the Frankish kings were at the head of that unity, the nominal centres from which a political power, debased but still Roman, proceeded. These kings were manifestly unequal even to the moderate task of governing the decline of civilization. The great landowners who formed by this time an intimate mixture of Roman and German families grew more and more important as communications became more difficult. Chief among these land-owning families was one which had acquired an hereditary position of predominance in the palace. This family had originated in a Roman noble of the territory of Narbonne, nearly 300 years before, but as was the case with nearly every other great Roman territorial family of Gaul, there had been continual intermarriage with families of German-stock, and prior to the Mohammedan invasion of Spain this family is found having its principal seat in that one of its many estates which lay in the eastern part of Gaul in the boundary of German-speaking territory. It was therefore, in the language of the time, an Austrasian family, for the French monarchy was roughly divided into Neustrian or Western and Austrasian or Eastern, though these divisions did not correspond to anything in race or language, but were convenient categories in which to reckon the topography of the scattered estates. This family was already virtually ruling in the place of the king when the great head of it, Charles, led the combined Gallic forces against the Mohammedan invaders who had passed the Pyrenees in 732. This horde of Asiatics, crossing various parts of the chain of mountains but proceeding mainly by the middle road of the Imus Pyrænæus, sacked the cities of southern Gaul, were turned northward by the resistance of Toulouse, passed through Poitiers and were marching upon Tours and the north when Charles Martel (Charles the Hammer) met them on the plateau of Dissay about half-way between the two towns. Their force was completely destroyed and Europe was saved. The son of Charles, Pepin, was still more patently the head of the state, though for several years he refused to accept the crown; and it is under him that Gaul appears as the protector of the Papacy, an institution which French military power was to support continuously for the next 500 years. It was only at the call of the Gallic municipalities and the hierarchy, but also by the direct sanction of the Pope that Pepin in 752 accepted the crown. He died in 768, leaving, as was so constantly the barbaric custom of the time, political authority divided between his two sons Charles and Carloman; the latter died in 771, and Charles, now 29 years old, became the sole ruler of the great territory which was now the only unbroken piece of the ancient empire and the only one subject to any sort of central authority; around it upon all sides, in Britain, in the German Marches, in the southern valleys of the Pyrenees and of the Asturias, in northern and central Italy, was a confused mass of petty lordships and beyond that again the external belt of enemies of the Christian faith and Christian civilization, the savages of Scandinavia and of central Germany, the Mohammedan power of the South. The great Charles, therefore, whose title in history is Charlemagne, stood upon the defensive, as it were, throughout his long and glorious life, holding an island of Christendom against the pressure of these external forces. His defense was successful and that long respite permitted Christendom to accumulate just so much strength as was sufficient in the next century to repel, though hardly to expel, the final assault of the anti-Christian power.

The reign of Charlemagne extends over 46 years, 43 of which he enjoyed as sole sovereign after the death of his brother, and during the last 14 of which he had mounted to that miraculous position which earned him the title of emperor of the West and has caused him to fill not only the legends of Europe, but also, as with an original light, all the beginnings of modern European history. His period, therefore, is one of the many of which we can say that the uninterrupted presence of one man at the head of a state for a long period gives that period a peculiar unity and significance. This is often true when the man is merely a symbol; it is particularly true in a semi-barbaric condition of society, when the man happens also to be of military virtue and a successful warrior. That the personal character of Charlemagne determined this wonderful episode in French history it would be an exaggeration to say, but that personal character made the episode possible; these 40 years and more are full of his individual effort and they have something personal and epic about them, like the eras which lie behind recorded history at the origin of every civilization.

He was 26 when his father died. Before he was 30 he had determined to extend civilization into the Saxon forests and he had begun to do so. In his 32d year he crossed the Alps; in his 33d (in 774) he destroyed the power of the Lombards in Italy, and for the second time confirmed, as his father had confirmed, the temporal power of the papacy. The next year he was back again in North Germany, and the next year, he returned again to Italy; the year after that, for the third time, he was conquering among pagans of Saxony, and this time received at least the oath of their reluctant allegiance. The next year he was off again over the Pyrenees, negotiating with, pressing back, harassed by, but checking, the Mohammedans. The Saxons rose behind him; he hurried north again.

In 781 he is yet again in Italy. He was not 40, and these first 14 years of his had been as full of violent and successful war as were the first 14 years of Napoleon. This elegy of rapidity and success, backed by a sort of renaissance of the Gallic spirit, so powerfully struck the imagination of the time as to make him, even in that period of rapid decay or transformation, the necessary leader of a united Christendom. It is from these swarming campaigns that the first new songs, or rather epics, of our modern Christian civilization drew their inspiration, notably from that check or defeat of his rear guard in the pass of the Imus Pyrænæus as he was retreating from Spain, a disaster in which his nephew Roland died and from whose memory sprang the noblest of Christian poems, the 'Song of Roland.' On Christmas Day of the year 800 the culmination of these campaigns saw him crowned in Rome Emperor of the West by the Pope. The old title thus revived was but a symbolic name. He himself could exercise central and imperial power in a manner only distantly resembling the old Roman model upon which his title was based; and in the century that succeeded him that title became little more than a name. But it can be said with regard to the title itself and to his individual occupation of it, that it revived, just before the memory of such an institution would have decayed, the tradition of an Europe united under a military head. That tradition has never wholly disappeared, and, fantastic as such a question may seem to-day, shall the future see it revived?

The remaining years of his life, though all around the frontiers of his empire the last effort of anti-Christian forces was ready to be made, were full of a sort of tranquillity and splendor which the insufficient knowledge of the time might vaguely compare to the ancient authority of Rome. He died 28 Jan. 814, at the beginning of his 72d year, and was buried exactly upon the confines of the two languages which he spoke, upon the limits of the civilization which he had preserved, in the old Roman watering-place of Aquæ, called since his time Aix-la-Chapelle, his favorite residence. There, in a church long since rebuilt, under the influence of mediæval French architecture, he still lies, surrounded by modern architecture more appalling than most that is to be discovered even in the rapid industrial development of North Germany in our time.

The experiment to which Charlemagne had devoted such energy and in which he had achieved such success, turned out both at the time and in the judgment of long future generations for more than he or his coadjutors had intended. The vigorous and united symbol of Christian and civilized government which his reign had afforded served as a bridge. It prevented Christendom from too often forgetting (though it necessarily largely forgot and blurred) its Roman origins and it afforded also a halting place to which the trials and the new youth of Europe could look back in succeeding centuries. The reign of Charlemagne is like a holiday, or like a light in the night. It breaks the continuity of the Dark Ages and largely through his intellectual vigor enables us to understand the transformation of Europe from the antique to the modern.

In spite of these qualities in the time, the vital forces of Gallic civilization were still declining. Men built less well and thought less well from year to year, and when the omnipotent chief of this military episode had died in 814, there broke, upon what was left of civilization, the heaviest storm it had hitherto endured. In that storm Europe, and therefore its surviving centre in Gaul, was nearly overwhelmed.

The pagan tribes of Scandinavia, a fresh horde of Mongols, a renewed splendor in Islam, all fought together against the Christian name. It was a far stricter ordeal than were the barbarian invasions of the 5th century; indeed, there was but little relation between these infiltrations of that period and the savage attack of this. The numbers were far larger, the opposing forces of civilization were far weaker, knowledge and discipline by which alone civilized men can resist barbarians were at their lowest ebb.

The issue had already been joined in the British Islands by the beginning of what are known as the "Danish Invasions." Some 30 years after the death of Charlemagne it menaced what was left of the Christian continent, and with the close of the 9th century it came to a climax. In that whirlwind two things of vast importance to the future of Europe occurred. The first was the military success of a Christendom absolutely united in religion; the non-Christian was beaten off by men of one faith and one ritual and of one immutable manner of thinking. The second was that so much was forgotten and so many traditions lost in the struggle as to necessitate the growth of a new society. It is in this close of the 9th century that the old owners of the land, mainly Roman or Gallic in ancestry, become territorial lords. It is in this period of darkness and upheaval that the long process of independence is at last achieved and that the village communities with their chiefs finally adopt those groupings for self-defense which are later called the Feudal System, and it is in this period that the subconscious national groups of Europe take on conscious form.

Two points of western Europe determine the struggle in favor of our tradition and of Europe. There are the southwest of England, Somersetshire and Berkshire, in which Alfred outlasted the savage invader and finally defeated him; and Paris, where, just before, the local forces had beaten back the same enemies in a memorable siege in 885.

The second alone concerns these lines.

To understand the city of Paris is essential to anyone who would understand the history of France. The town has played for a thousand years the same part in the government of that country that the English governing class or plutocracy have played in Britain since the Reformation. Thence have orders proceeded; thither has intelligence flowed, and there has been fixed that specialized organ of administration, round which all national development gathers, and which, though it has many names in many polities, is a necessary nucleus to every great nation.

Paris had risen to its great position through the waterways of northern France. In the breakdown of Roman order the disuse of the roads and the collapse of the posting system had increased the importance of the rivers in a nexus of which the city found itself and from the last Roman emperors it had maintained a sort of special place, not as a capital (for there was no such thing), but as a chief town — the town of Clovis and of the early kings, the town in which the early Carlovingians came to die and in whose shrine they were buried.

The local chief — who stood the siege of 885 — was by name Odo. Of the ancestry of his father, Robert, we are not overcertain, but from that father and his descendants sprang that line of men who symbolized the rejuvenescence of Gaul when the struggle was over, and in whom centred that which was at once the symbol and the organ of the new nation: the monarchy.

Robert the Second, the brother of Odo, was, like Odo, elected to a rough kingship, in the contempt which all felt for the decaying idea of the Carlovingian empire, and the grandson of this second Robert, Hugh, was formally crowned at Noyon, and the separation of French government from the mass of Europe was complete.

From that moment, for exactly 800 years, to the assembly of the nobles under Louis XVI, the monarchy, retained in one house, perpetually increasing its power, is synonymous with and develops the consciousness of the nation. This date, 987, stand as the second landmark in the history of France, and our first business before entering the story of that great development is to consider how Gaul looked when the first of its nominal chiefs was crowned.

Beneath the various episodes which have been described beneath the great names of Clovis, of Dagobert, of Charles Martel, of Pepin, of Charlemagne, of the Robertian House of Paris, whose principal descendant, Hugh, we have just seen crowned, a slow but complete molecular change in society had taken place. The old Roman order had not only decayed, it had also been internally transformed in the 500 years which intervene between the invasion of Clovis and the crowning of the first French king. The slaves of the old Roman landed estates, though still legally slaves, were no longer bought and sold; they had become Christian freemen; the old Roman landed estate had become Christian village and parish; in the breakdown of communications and of learning, agriculture had become, as it were, the sole industry of men. This agriculture had grown to be neither an individual nor a servile, nor what we should call to-day a capitalistic industry, but a co-operative one. The old Roman landlord was now no longer the possessor of the whole territory of a village; only a portion was reserved to himself and the village population beneath him had grown by centuries of custom and of cohesion to security of tenure and to fixed and customary payments of labor in the place of that surrender of all their energies which their former servile condition had implied. The vast mass of the population, therefore, lived as perpetual holders of land at a fixed and customary due of labor or what-not paid to a local superior; they cultivated the fields together, but apportioned the result in proportion to their respective holdings. The lord with his much larger holding, as he was the richest among them, was also their protector, and, in a modified way, controlled by tradition and by the assessment of his own tenants, their judge. The village so organized was a microcosm of the whole of society. For centuries the noble class, the men descended from the old Gallo-Roman owners of land and of slaves, had tended more and more to regard themselves also as tenants whose absolute ownership, though absolute, was part of a social system involving superiority, social and executive, in some greater man among their number. They had coalesced in groups, usually under the largest landowner of the district, during the pressure of the barbarians wars; the man owning but one or two villages would "recommend himself" to some local man owning 10 or more, and he in turn to some very wealthy personage of the countryside who had accumulated by marriage or inheritance the dues and the lord's portion of, let us say, a hundred villages. And long before the Carlovingian line was extinguished or the new Capetian line was acknowledged, society had become a complicated territorial system with the tenants of the village dependent upon but secure under the village lord, and with the village lords forming indeed one noble class, but arranged in a hierarchy of dependence from the small man, who was but lord of one village, through the big local man of the countryside, up to the overlord of a whole province. What determined the size of these provinces it would be impossible to say; some, like Normandy, were but old Roman divisions which had maintained its boundaries; others, like the March, in the centre of France, were vague to a degree, built up of intricate local traditions and customs, and in dispute with their neighbors for all except the very centre of their dominion. Some were quite small, little more or less than a bishopric in extent; others were virtually independent kingdoms, like Brittany; but of all it was true that they formed the true subunits in the general national unity. The particular house which had been given the symbolical and nominal headship of the nation under the title of king were the dukes or local overlords of the Isle de France, a territory of which Paris is the centre (they were the lords of Paris, as we have seen), and which extends, roughly speaking, for three days' march round the city. To this house, once the head of it was crowned, the other great houses swore fealty, thus completing the hierarchy system which in its complete later and legal form was called *feudal*. It must not be imagined that the system was as yet symmetrical, even in theory. Not all the efforts of the lawyers during the next three centuries, the 11th, 12th and 13th, while it was still quite vigorous, could make a thing of such obscure and natural origin symmetrical. But the general arrangement of society, the small farmer secure on his holding under his lord, that lord under a wealthier man of the same countryside, he again under a duke or count of the whole province, and he again swearing fealty to the king, who was the symbol of the national unity, is the great social fact we must keep in view if we are to appreciate the development of modern France out of the Dark into the Middle Ages.

This family, the overlords of the Parisian centre who had been crowned king, for a century did nothing but accumulate in their hands more and more manors and cultivate by an instinct those remaining forces of civilization, the municipalities and the Church, which everywhere unconsciously strove to reproduce the old Roman order which had so nearly disappeared in the Dark Ages. To Hugh, in 996, succeeded his son Robert; to Robert again, in 1031 his son Henry; to Henry, in 1060, his son Philip, and to Philip, at the opening of the 12th century, succeeded, first in actual and next in theoretical kingship as well, his son Louis, "the Fighter," with whom a new expansion of the power of the Crown begins.

Thus four men, each in direct succession, each crowned coadjutor during his father's lifetime, each arriving at the throne in the vigor of his manhood, for well over a hundred years secured the continuity of the new experiment. None save Hugh was remarkable for domination; Robert rather for piety; Henry for a quiet tenacity, Philip for debauch; but all, to some extent in spite of themselves, were accumulators of territorial wealth and influence and every social influence of the new time worked upon their side. That time, the 11th century, was one in which the energies of Christendom suddenly awoke. No new forms were discovered for it, the old architecture continued, the old customs were observed; but everything from the Rhine to the Atlantic and from the Tagus to the Channel was boiling with a vigorous and novel life destined to bring forth the Middle Ages. The advance from the Pyrenees against the Mohammedan begins in the generation just after Hugh Capet's crowning, and the entry of the Christians into Toledo is effected within that hundred years. It is the time when the curious phenomenon of cross-breeding, the vigorous, unique but ephemeral "Norman" race comes into being, spreads civilization through England, conquers, unites, administers and forever attaches to Europe and separates from Oriental influence the south of Italy and Sicily. It is the time when consonant to the necessities of such new vigors and such new light, the Christian Church redefines its unity, cleanses and organizes all its machinery and imposes a working discipline under the advice and, at last, the papacy, of Gregory VII.

Many new phenomena advance in parallel, all connected with the general advance of the time, but each following its own path. Architecture does not change, but is everywhere pursued with magnitude and vigor; men are still ignorant of the world outside the Western Christian unity, but although definite learning has not yet been organized, curiosity is wide-awake; and the municipalities which had remained so long anomalies in the agricultural system, osseous relics, as it were, of the old Roman structure, begin again to live everywhere by an independent life. The new roads are not yet built; men still march along the old decayed Roman highways, or make use of the river systems or of the sea; land is not yet bought and sold; no universities are yet in existence; no Gothic arch has yet been built; vernacular speech is but a tentative beginning unknown in England, very local and disparate in France, in the Spanish kingdoms and in northern Italy; no representative system has yet met (save among the clergy), but all these things, the representative system, the Gothic architecture, the universities, vernacular literature, are in seed and are germinating during the 11th century. The outcome of these various energies, their climax and at the same time the events by which they were to be made fruitful, was the Crusade. The long example of the fighting in Spain, coupled with the unrest of the multitude and with the critical condition of the Eastern pilgrimage, had kindled a flame, and there poured out in successive hordes, mainly from Gallic territory, a host on the march for Jerusalem, the latter and organized portion of which must have been as numerous as that with which Napoleon invaded Russia, the unorganized forerunners of which may have numbered a million souls. Established by the papal sermon of Urban II in 1095, equipped in the next year in the summer, they trailed out in a prodigious raid of over 2,000 miles, and three years later, 15 July 1099, the remnant that had survived or persevered stormed Jerusalem and established for close upon a century the curious French experiment of a Christian outpost against Asia, established in French castles, defended (in such a climate!) by French armor mounted upon French horses, in the isolated belt of Palestine and of the Levantine coast.

The effect of that march was overwhelming; the sudden expansion of experience, the awakening of the mind, which accompanied it, produced the Middle Ages. And when from 1100 to 1115 such lords as had not established themselves in the East returned to Gaul, they discovered the monarchy renewed, and the national movement in full strength under the vigorous personality of Louis, who, though the first of that name in the Capetian line, called himself, in memory of the Carlovingians and of the Merovingians, "the Sixth." The towns, the hierarchy, the populace, everywhere seconded this refounder of the monarchy, and when he died, in 1137, his son Louis succeeded, heir to an executive power which was no longer founded upon territorial possession nor merely the nominal feudal bond between the great overlords, but possessed a military power of innumerable garrisoned fortresses, of a legal corporation actively allied to the Crown, and of market-towns and great cities which throughout the territory of Gaul were prepared increasingly to insist with every new generation upon the power of the king of Paris in whom they saw the living figure of the nation.

Now, at the end of the first third of the 12th century, France and Europe were fully awake. A whole generation had grown up accustomed to territorial expansion (it was a generation since the Christians had entered Toledo and a generation since the first Christian king of Hungary had died; a generation since civilization had re-entered England and a generation since the first Crusade had brought the West into touch again with the East and had begun again to teach the Christians of the Mediterranean the uses of the sea. It was a generation since the papacy had become a free and self-organized thing, elected from within the hierarchy, and a generation since unity of discipline had been established throughout the West by the powerful will of Gregory VII).

The first effect of the new life was the awakening of intellectual discussion, and of this discussion France, and Paris in particular, were the seat. It turned upon the fundamental problem of all philosophy, the reality of ideas. It had for protagonist Saint Bernard upon the orthodox side, and, in a manner which pretended to compromise but which was really opposing, the brilliant genius of Abelard upon the side that would have led to schisms and perhaps at last to the negation of God. That debate consciously or unconsciously is still in progress; the affections and sympathies of the two parties are to-day much the same. Out of it arose as its first fruit the University. Paris began to found those colleges and to group them into that united organism which soon became the great European model for the collegiate university. Parallel with the growth of a new curiosity came in the same place and from the same people the marvelous symbol of Gothic architecture. Suger, the abbot of Saint Denis, the friend and counsellor of King Louis VI, and in a sense the guardian of his son, was the first to light the flame. The south tower of his façade is the first bit of true Gothic in Europe. The same masons who had built it in their youth might have lived in their late manhood to see the beginning of Notre Dame; and with Notre Dame, the first great Gothic building of northwestern Europe, the style was fixed.

All this movement and advance corresponded to the reign of Louis VII, the son of Louis VI, and to that middle period of the preceding century which is marked by «the Second Crusade,» and in which it was increasingly felt that the French hold on Palestine was doubtful and precarious. This reign was of great length; it stretched from 1137 to 1180; its central episode, the Crusade, was undertaken upon the news of the fall of the frontier fortress of Edessa; it occupied the two years from 1147 to 1149, consisted in a futile attempt to take Damascus, and did little other than weaken the prestige of the Christian name in the East.

As has already been pointed out, not only the Crusades but the new movement and expansion of Europe, the reflowering of civilization had necessarily helped the growth of the power of the Crown; that power, apart from the ceaseless support of the clergy, the lawyers and the towns, reposed upon two territorial bases, the king's political position as superior over the great provincial lords, and the king's economic position as private lord over a number of manors and countrysides. In the first of these he could grow only by the growth of an idea, but in the second he could grow in a material and actual manner. Already the crusading movement had led in Louis VI's time to the Crown's becoming direct lord of the province of Berri, and thus obtaining direct possession of a district south of the Loire, and in a vast number of minor cases, only a certain proportion of which even are recorded, the commercial and military movement of the time was letting isolated manors and lordships fall by escheat, by confiscation, by disputed possession, and in general by the active presence and effort of the lawyers, into the king's hands; and with every new step in the power of the kingship, the consciousness and unity of the nation increased also.

An accident coming immediately after the second Crusade, an accident which for the moment seemed to check the rise of the Capetian house, proved within half a century the main factor of its definite establishment. The heiress of the crown of England, Matilda, the granddaughter of the Conqueror, and widow of the German emperor, had married the lord of the great province of Anjou. Her son, Henry, landed as a boy in defense of his mother's rights against Stephen of Boulogne who had contested the English succession and was acknowledged heir. In 1154, therefore, by various relationships Brittany, Anjou and other lordships were in the hands of a young and vigorous soldier who also became king of England and Duke of Normandy. Or, to put it as the French lawyers saw it, the dukes of Brittany and Normandy, the Count of Anjou, etc., were all merged in one person, and that person was the powerful king of England. Nor was this all: The vast territories of Aquitaine, a feudal overlordship which, roughly speaking, comprised all the southwest of France, had ended in the hands of an heiress, Eleanor; the male succession had failed. Eleanor had first been married to Louis VII of France, and had accompanied him on his crusade; her desperate character had led to a divorce, and immediately upon its pronouncement at Rome, Aquitaine, after its momentary union with the crown of Paris, fell into the hands of this same young claimant to the crown of England, for the divorced woman married him. The position, therefore, on Henry II's accession was this: That the feudal lordships of all Gallic territory west of a line drawn roughly from the centre of the Pyrenees to the neighborhood of the mouth of the Somme were in the hands of one man, and that man the king of England. In pure theory the French Crown stood as it had stood before: it was still overlord of the whole, and Henry of England had to do homage separately for each province; but in practice three things gravely modified this theory. First, the united control of territories which in the aggregate formed two-thirds of French territory; secondly, the fact that these two-thirds included the maritime and commercial portion of every single great French river (Rouen, Nantes, Bordeaux, were all within Henry's boundaries) and thirdly, the complication by which these maritime provinces were in the hands of an island king. There is little doubt that if the relationship had endured for a couple of generations, its theoretical side would have weakened to such a degree that the Capetian power would have dwindled to a shadow and very soon a Plantagenet would have ruled in Paris. It did not endure. When Louis VII died in 1180 he was succeeded by his son Philip Augustus, a man in whom the energies and the clear judgment of this new birth of civilization seemed to centre. It is evident that from the beginning of his reign Philip Augustus' great object was to destroy the overwhelming position of the house of Anjou. Fissures were opened in the great fabric by the perpetual revolts of Henry's sons under the impulse of their mother, a curse to her second, as she had been to her first, husband. The fall of Jerusalem in 1187 led to a third crusade. The old king Henry died; his son, Richard I of England, still nominally the lord of all these territories, went to the rescue of the Holy Land as did Philip Augustus himself. Richard was imprisoned on his return; the French king intrigued to prolong that imprisonment, and though he failed, fortune was on his side when Richard I died at the siege of a castle in 1199, leaving England and all the French lordships to his brother John. The opportunity afforded by John's character was exceptional; his premature regency, his license, the envy aroused by his cultivation and his prowess, united against him the feudal aristocracy of England. The claims of Arthur, his nephew, the heir to Brittany, and in strict right his senior in succession to all the territories, coupled with complaints due to his marriage with the betrothed of the Count of la Marche, and the rising of Poitou, gave Philip Augustus a pretext for summoning John as feudal inferior to clear himself before a court of his peers. He failed to do so; his land was declared forfeit; the claims of Arthur were pressed. This was in 1202. In the war that followed young Arthur was captured and shortly afterward disappeared. John was accused of the murder, and the powerful armies of Philip were supported by the general indignation of Europe. By the end of 1205 only a few towns near the seacoast remained in the hands of the English king. Though the physical conquest of the Angevin territories was thus achieved, the victory was not really ratified till 1214. In that year John, the best diplomatist of his age, rallied against Philip Augustus all the forces which it was possible to bring, moral and material, into the field. The Count of Flanders, against whom Philip Augustus had resolutely set the Roman municipalities of that district, the German emperor, and the sympathy of the papacy were marshalled in this critical month of July against the French Crown. Philip Augustus won a decisive victory. It was not only a decisive victory for the French Crown at that moment, it was one of the very few battles in which history may be said definitely to have marked the success or failure of a great historical cause, and it affirms for 600 years the power of the French monarchy and for a much longer and indefinite period the unity and existence of the French nation. It had also its reaction upon England, for the aristocratic insurrection against John was emboldened by this defeat of his to press on to the consummation of Magna Charta.

Meanwhile yet another factor had entered into the rapidly growing consolidation of the Capetian hegemony. The Albigensian Crusade had been undertaken and had succeeded.

Contact with the East has invariably produced upon Western Europeans an effect which may be compared with the effect of a spell, and usually of a maleficent spell. Its effects may be clearly observed in those modern nations which have the misfortune to be intimately mixed (especially if their governing class is intimately mixed) with the Asiatic. Oriental customs and vices and Oriental weakening of European health enter in with too much knowledge of the East. The Crusades, now a century old, had cast such a spell over the highly civilized townships of the south of France, and a confused mass of Oriental customs whose origins or nucleus had in the town of Albi overspread the county of Toulouse and its surrounding territory. The danger grew with startling rapidity; the Pope called against it the military power of the overlord, the northern barons especially answered the call; the fight began in 1208, and the re-establishment of Christian unity and civilization was effected within four years. This campaign, which in the eyes of contemporaries was mainly a campaign for the unity of the health of Christendom, has for these notes the particular importance that it converted what was already a nominal into a real supremacy of the power of Paris over the southern portions of Gaul. The date 1215 may be taken as the term of all this development. England was now pledged to an aristocratic policy which would weaken the growth of a great civilized state. The Lateran Council had affirmed, in its most determined form, the framework of mediæval Catholicism, the Capetian crown had triumphed over all its enemies at Bouvines, the south was definitely in the grip of the monarchy; and on the southern frontiers of Spain the great and successful fight of Navas de Tolosas had extinguished forever the threat of the Mohammedan. Henceforward Islam dwelt only upon sufferance between the extreme boundaries of Andalusia. In Paris, the Louvre, the symbol of the established monarchy was built, and round the city the great new wall, built at civic expense, was the symbol of that new mediæval civilization which was in a way the resurrection of the Roman municipality. The university was chartered and active; the epoch of the 13th century, the climax of the French race and certainly the climax of European development between the Dark Ages and the Renaissance, had come to flower. Philip Augustus died in 1223. The three short years of his son Louis VIII were mainly distinguished for a triumphant march through the south, and in 1226 the personality who stands most for the 13th century in Europe and in France, that of Saint Louis, the grandson of Philip Augustus, was seated upon the throne.

He was but a child, under the tutelage of his mother, Blanche of Castille, but even during the period of her guardianship, which was troubled by civil war, as such minorities invariably were, the power of the Crown was but the more confirmed; and from the time when the king was of age until he undertook in 1248 his first crusade, there was established by example and by vigorous action so absolute a strength in the monarchy that all the defeats and vicissitudes of the next 200 years were unable to shake it. It had acquired a sanctity that was almost legendary and an actual force which made it coincident with the National life. The crusade of Saint Louis was directed against Egypt, for Palestine was now a dependency of Cairo and the recovery of the Holy Land could only be accomplished by the reduction of the Mohammedan power upon the Nile. The five or six years during which the effort lasted were, upon the whole, unsuccessful. Saint Louis returned in 1254 with a vastly increased reputation, by far the chief figure in Europe, but there remained of the old French garrisons in the Levant nothing but few port towns at the mercy of occasional sieges, and doomed to ultimate capture. The 16 years that followed were years of quiet and successful administration, during which the most interesting experiment was that in which Saint Louis, after defeating Henry III, the English king, in the south, granted him a narrow territory in that region as the price of what was imagined to be a lasting peace. The king, though long past his 50 years, was moved in 1270 to another crusade. The attempt this time was made against Tunis, but at its very inception Saint Louis died on the spot that is now marked by his chapel at Carthage. It is possible that the expedition to Tunis was suggested by the position of his brother, Charles of Anjou, in the south of Italy, for Charles, who 25 years before had married the heiress of Provence (thereby still further increasing the power of the house of Paris) had been called in by the Pope to combat the last efforts of the German Empire in Italy, and held for the moment, but only for the moment, the sovereignty of Sicily and of the kingdom of Naples. The massacre of the French in Sicily in 1282 put an end to his power, but it did not afford any opportunity for the interference of the Empire with the papacy or with the affairs of the Italian Peninsula. With the fall of the last Hohenstauffen, the mixture of the Germans in Italian affairs comes to an end and henceforth the anarchic welter and ill-organized conception, which had called itself for the last 300 years the Empire, meant nothing more in politics than a loose confederation of shifting Teutonic lordships. The valley of the Rhone, over which a German executive power had nominally existed for so long, though not yet technically subject to the French king, was now virtually within the orbit of which Paris was the centre. The reign of Philip III, son of Saint Louis, from 1270 to 1285, contains little of moment. His son Philip the Fair, who came to the throne in this latter year, marks, despite evident signs of internal decay, the summit of the material power of this first unbroken Capetian line. His mother, the heiress of Navarre, brought to the Crown that kingdom or province. His long struggle with the papacy ended in the capture of that institution, the election at Lyons in 1305 of Clement V, and the presence at Avignon of French popes for 70 years. He had the strength to destroy the gross and highly dangerous power of the Templars, a military order which had grown to be an immensely wealthy secret society upon which the just execration of the European populace fell from every side. When he died in 1314 it seemed as though no further advance could be made in the strength of the French sovereigns. Yet it is from that date, or shortly after, that the chief peril of the nation and of the house itself must be counted. For Philip the Fair left three sons; and, by a catastrophe hitherto unknown in all the three centuries which had seen the rise of this great family, a direct male heir to the succession failed. These three sons, Louis X, Philip V and Charles IV, each enjoyed a brief reign, and each failed to leave a son who would succeed him. The whole course of the three reigns covers no more than 12 years, and the only chance of a direct succession lay in a man-child, John, who died within a week of his birth. Charles IV did indeed leave a daughter, but the tradition which had strengthened for so long and whose example had been so glorious, by which a male heir alone could succeed, led through a curious legendary fiction or memory, embodied at last in definite constitutional terms and called by the name of "the Salic Law," to the rule that only a man should succeed to the throne. The nearest male heir, therefore, if this baby daughter of Charles IV were to be set aside, was the first cousin of Charles IV, Philip of Valois. Philip the Fair's brother Charles had been granted the title and position of Valois. It was his son who now laid claim to and immediately mounted the throne in the year 1328, 14 years after the death of his uncle. The Capetian house had proceeded without check from father to son in the virtual control of the town of Paris and the duchy of France for more than 400 years. For 340 it had held that position with increasing magnificence, the son regularly succeeding the father, and crowned in the father's lifetime. It had at last come to be the strong ruler of a great and united nation, a nation which was the centre and core of mediæval civilization. It was impossible that so great a change, though it were but the accession of a near collateral, should pass unchallenged, and the challenge came from Edward III of England. There was no claim worth calling a claim upon his part to the French throne, nor is it absolutely certain that at first he put forward the plea of blood. To inherit at all he would have to inherit through women, and even so he did not stand first in the succession. The policy of the French king of Flanders, his harassing of the great English trade with the ports of the Low Countries, afforded a pretext in 1336. In 1337 hostilities broke out; in 1339 the English king, Edward III, quartered upon his shield the lilies of France, which were not finally abandoned until the middle of the 18th century. And from that year may be said to date, in legal and heraldic theory at least, the struggle of the Hundred Years' War.

The epoch or trial upon which the French next entered, that of the Hundred Years' War, falls into two very distinct parts: In the first part, which corresponds roughly to the second half of Edward III's reign in England, successful and brilliant raids terminate in startling victories, and the French Crown consents to abdicate a portion of its territory. During this first part of the wars, the armies proceeding from Britain were commanded by French-speaking nobles and a French-speaking king, and though the English language was in process of formation, and an English national spirit was already apparent, the whole thing was a chivalric adventure based upon the Gallic model. Then there was a lull, corresponding roughly to the reign of Richard II in England, during which again the English lose ground.

At the end of Richard II's reign in England the cadets of the royal line, the house of Lancaster, usurped the throne. The usurpation was downright and even cynical — it was, of course, hateful to the morals of that time, nor could the Lancastrians maintain themselves in power save by a sort of reign of terror, coupled with a strict alliance with the wealthy and official class. Of all the elements which had gone to build up the English oligarchy, with the exception of the Reformation, none has been so powerful as this Lancastrian usurpation. The experiment rapidly led, as all such experiments have in all countries, to a foreign diversion. The war with France was renewed, but in a very different manner. The English king now claimed a real power. He was an English-speaking king, a soldier of extraordinary capacity, and very soon became, especially after his first great victory, Agincourt, a national hero. The old mad king of France in Paris was compelled to marry his daughter to Henry V of England, and the rightful heir of France, the Dauphin, was thrust out, to the advantage of the issue of that marriage, who became the English king, Henry VI. What followed is common knowledge. Henry V of England died; a vague national sentiment rose throughout French territory, and was embodied in the person of Joan of Arc. After one of those desperate and foot to foot struggles which are characteristic of French military history, the Capetian house gradually recovered all the territory which had been lost. The final expulsion of the last English garrison coincides, roughly speaking, with the close of the Middle Ages. This great struggle was accomplished within a few years of the development of printing and within a generation of the discovery of America.

A recapitulation of the main dates of the Hundred Years' War will not be without value to the reader.

Philip of Valois had his first engagement with Edward III upon the fall of Cressy in 1346. The English, though a far smaller force, gained a complete victory. Immediately afterward the town of Calais fell to Edward III. This did not lead to any immediate disintegration of the power of the French Crown, though that power was gravely shaken. The next years were occupied with the great plague, the Black Death, which, though its effects have been so greatly exaggerated, especially by English historians, does form so deep a division across the history of Europe. These years indeed, though suffering from the English attack, saw an extension of the power of the king of Paris, for Philip bought the town of Montpellier in the south and acquired in full right a province which had now for 100 years been within the French orbit, the Dauphine.

Philip died in 1350. His son, John, was 30 years old on ascending the throne. The truce which had been established between the two countries had come to an end. The king of England again took advantage of the disturbed state of France (characterized by the convocation of the Northern States-general in 1355) to push the attack. In 1356 the Prince of Wales, now a young man and an excellent cavalry leader (Edward the Black Prince), was advancing from the South while his father had sent a powerful army into Normandy. It was again a small cavalry raid supported by bow men that decided the issue. The terms offered to the French king by the Black Prince were refused, a battle was engaged near Poitiers, and not only resulted in an overwhelming victory of the small English forces, but in the capture of the French king. The result of this dramatic victory was the temporary dismemberment of the kingdom. The wealthy merchants and some part of the commonalty attempted a government under Etienne Marciel at Paris in the absence of the king, and convoked the National Parliament.

In 1360 John in his captivity consented to cede the southwest in absolute sovereignty to England, and for the first time in its history a portion of the territory of Gaul was separated though temporarily, from the national sovereignty. John returned and died in 1364. In the same year his son, Charles V, not quite 30, that is much of the same age as his father on ascending the throne, took over the government. He had already been the virtual head of the government for several years. Under him du Guesclin, against the spirit of the treaty signed with England, but with great courage and capacity, attempted the reconquest of French territory. A long Fabian series of skirmishes followed. The Spaniards defeated the English fleet at La Rochelle and permitted du Guesclin to recover Poitou from the English. Brittany, after the long doubt of the whole generation, began to support the French cause; Edward of England in his old age landed again, but his army was exhausted by perpetual dilatory tactics on the part of the enemy, it was virtually destroyed as a fighting force by disease and fatigue and ill-organization, and the old king of England died, after signing a disgraceful truce, in 1370. Charles V of France held the throne till 1380. The country was impoverished, although the ancient power of the Crown had revived, and the new king, Charles VI, suffered on his accession from double disability. He came to the throne as a minor and he had madness in his blood. His very long reign (he was upon the throne for 42 years) led to nothing but disaster. The weakness of his character led to a struggle between two rival factions, known by the names of their leaders as the Armagnacs and the Burgundians. The Duke of Burgundy died in 1404, but his successor, John the Fearless, continued the struggle, seized the heirs to the throne and virtually governed Paris.

The Armagnac faction, now deriving its name from a marriage of the heir of the Duke of Orleans with the heiress of that family, began to press upon the Burgundian power and was undoubtedly favored by the people in general, and secretly by the poor king. The Gascons, the chief military element on the Armagnac side, were marching on Paris; a civil war of the most desolating kind broke out; when the moment appeared propitious for a new descent on the part of the English king.

In 1415 he landed in Normandy. It was originally, like the earlier wars, a mere raid, but it was far more successful than former raids had been. Normandy was completely conquered, after the utter breakdown of the French army at Agincourt, and finally on 21 May 1420, the Treaty of Troyes was signed, whereby Henry V married Catherine, the daughter of Charles VI, and was declared heir in remainder to the Crown, with his descendants. The Dauphin was legally outlawed, and the position seemed secure for Henry, when in 1422 he died, followed immediately afterward by Charles VI after a reign of 42 years. There immediately began the struggle for the recapture of the territory, and that struggle was successful. Although a son had been born to Henry V before his death, and had been solemnly crowned on his father's death, as Henry VI of France and England, at the age of barely 12 months, the armies of the Dauphin began the reconquest. The chief elements in this were the defection of Burgundy, and the appearance of Joan of Arc. When the struggle had continued with doubtful success for seven years, this child of 19, confident of a supernatural mission, approached the court of the exiled Dauphin — Chinon, recognized there by some supernatural power both the king and various historic relics presented to her, relieved Orleans, had the Dauphin crowned in Rheims after a successful march across country, and in general roused in the army and the populace a confidence of success. She was taken prisoner in the second year of this marvelous career, outside Compiègne, after being wounded in her failure to capture Paris. She was sold to the English and burnt alive at Rouen. Nevertheless the English garrisons perpetually retreated or surrendered, and in 1435 the Duke of Burgundy himself abandoned the English Alliance, and with that act, of course, after the defection of so many of his supporters, all further English successes became hopeless. A few garrisons still held out, notably the Saint Michael in Normandy, but Paris was taken the next year and Rouen in 1453; and when Charles VII died, in 1461, the French territory was clear. He was succeeded by a son who had rebelled against him, a man approaching 40 years of age, of a character dark, intelligent, very powerful and tenacious, deeply religious, and a little mad, known to history as Louis XI.

Louis XI, who next succeeded to the throne, had to meet a combination, common enough at the close of any great epoch, coming as he did at the close of the Middle Ages; that is, a combination of forces which depended upon the ritual service still paid to old names and old ideas, but which only survived as clumsy anachronisms. In this case the forces with which he had to contend were the last forces of feudalism. Feudalism had long lost its vitality, and instead of having to meet a rebellion of local lords numerous and well founded in their localities, he had to meet a combination of very great men most of them of blood royal but depending upon feudal theories and technicalities for their rebellion against him. His brother, Charles of France, the Duke of Brittany, and the heir to the duchy of Burgundy, banded themselves under the name of "The League of the Public Good," won the battle of Montlhéry and proceeded as they thought to a complete success. It was here that for the first time Louis XI's powerful if not quite sane character appeared. He immediately gave way, where a weaker man would vainly have resisted, granted Normandy to his brother, made Saint Pol a Constable, and in general did all that could be done with the mouth and the pen. But it is a rule throughout French history that periods in which the French executive acts in this fashion are those which accompany an increase of force for such an executive, and for the nation. Within three years of the defeat he summoned his Parliament at Tours. The nation as a whole was now, as always, in support of the Crown against the wealthier merchants and the aristocracy. Louis received the strongest popular support, he incited the commercial towns of the Lowlands to rise against his enemy of Burgundy, he organized the military force of Paris, and though Charles of Burgundy, who had now succeeded to that throne and who is known to history as Charles the Bold, was still far stronger than the French king, compelled him to attend the sack of Liege and even to sign the Treaty of Perronne in which Louis granted Burgundy complete independence, the Capetian could not but win. On his return to France he summoned an assembly of the notables, they denounced the Treaty of Perronne, and Charles of Burgundy's invasion of France which immediately followed was checked by the resistance of Beauvais. Everywhere in the Lowlands, in the heart of France, in his Parliament and in the small provincial towns, it was the Commons who sustained Louis XI. And the Commons in France were beginning to be that which they had long ceased to be in England, peasants and small tradespeople. For in France the end of the Middle Ages tended to be democratic: in England aristocratic.

The end of Louis XI's reign emphasized at once his curious character and his successful policy. The extravagance of his religion and the cruelty of his revenge were never more apparent than in the last years of his seclusion; and yet it was during these last years that the death of Charles of Burgundy in battle against the Swiss gave him that province. When he died on 30 Aug. 1483, with all the provinces he had reunited to the Crown he governed almost automatically by far the greater part of the territory of modern France. Brittany alone was quasi-independent.

His son Charles was only 13 at his father's death, and the kingdom was under the guardianship of his elder sister Anne. She was well served. A second revolt of the great men in the kingdom was crushed at the battle of Saint Aubin du Cormier, and five years later Charles VIII, having now freed himself from his sister's power, married the heiress of Brittany and united that province to the Crown. He next invaded Italy in pursuance to a claim to the throne of Naples. The military result was small, but the moral results large. First, and by far the most important, the military temper of the nation was given an opportunity to exercise after the long and successful diplomacy of his father. Such foreign wars have always been of the utmost stimulant effect upon Gaul. And the second result was the introduction into France of the Italian Renaissance. When Charles VIII died, still quite a young man, in 1498, he was succeeded by the Duke of Orleans, a distant cousin of his, the great grandson of Charles V, who was the nearest male heir, and who had led the great insurrection of 12 years before. This prince, among the most sagacious and temperate of all European kings, insisted as a matter of policy upon renewing the Breton marriage, though the experiment was perilously near incest, continued the Italian invasions, effected an alliance with Henri VIII, marrying Mary, a sister of that king, and died on the first day of 1515 with power more complete, a territory more united and the military organization of the kingdom more thorough, than any of these factors in French history had hitherto been.

This date, the opening of the year 1515, is of such moment for France and for all European civilization, that a short digression is necessary in order to appreciate the change we are about to witness.

The change which fell upon Europe in these first years of the 16th century is not one to which precise causes can be ascribed: it was rather one of those whirlwinds which appear to blow from without the field of material observation and of material causation, though it is indeed true that the mind of Europe had been stirring uneasily and with increasing force for three generations past. The movement which was to be of such prodigious consequence, and to which we owe the modern world, took two forms; the first of which was evidently of vast moment, the second of which at first appeared to be a particular and local phenomenon. The first was an extension of human knowledge and a rediscovery of the past. The second was the revival of those interminable theological discussions which had been wearily familiar in Europe for more than a century past. The revival of learning, the discovery of antiquity, the expansion of the known world and so forth, for a hundred years occupied the chief energies of men, but side by side with that great wave of change went with expanding force the theological discussions of the time, until their united effect was such as to split asunder the unity of Europe; that unity has not yet been regained, though it very nearly was under Napoleon, and though the trend of things to-day is to achieve it at the expense of bitter conflicts. When this enormous result of pettifogging theological discussions was apparent, even educated men woke up to the importance of what had hitherto been a by-product in the general intellectual movement of the time.

This waking up, so to speak, to the importance of the religious quarrel took place in the middle and toward the end of the 16th century, but it was not until the 17th century had opened that the schism was irredeemably fixed or that the division of Europe into two camps of opposed thought and morals was reluctantly accepted. This period of ferment is covered in French history by six reigns. That of Francis I, from 1515 to 1547, very nearly contemporary with the reign of Henry VIII in England, was occupied with the glories of the Renaissance. It also corresponds to the reign of the great Emperor Charles V, and covers the first stage of the theological discussions already alluded to.

The first 10 years of Francis I's reign were occupied with foreign ambitions, and were closed by his defeat at the battle of Pavia in 1525. He was defeated, and only obtained his liberty with difficulty. The remainder of the reign is concerned with the transformation of architectural and every form of plastic art under the inspiration of his court, and quite late — in 1535 — it was occupied with the beginning of the persecutions, an attitude which is retained during the remaining 12 years of the reign. Meanwhile, however, as the middle of the century approached, and as the principles of the Reformation obtained hold in Germany, the French kings saw the opportunity for maintaining the independence and increasing the greatness of France, against the overwhelming power of the Hapsburg house which surrounded them on every side, in Spain as upon the Rhine, and in the Low Countries. This opportunity was afforded by the Reformation which was supported in Germany as everywhere by the squires and the great merchants, and all those who desired to break from the central authority of the Crown. From this period, for full 200 years, it was the constant policy, now more, now less active, of the French monarchs, to support the petty Protestant communities against the general authority of the Empire.

The next reign, that of Henry II, was imbued with this idea, although the repression of the Protestant movement at home was continued.

Charles V, who had survived Francis, engaged in war against that policy, but was checked by the defense of Metz. At the end of the reign, in 1559, Henry II had done little to check the growth of Protestant feeling in France itself, had powerfully aided it in Germany and had secured for the French monarchy the district of the three bishoprics. The wife of Henry and the mother of the next three kings was a Medici — Catherine, a woman of singular courage, probably corrupt in temper and certainly in physique. The first two of her sons to succeed, Francis II and Charles IX, were not quite sane and were even more uncertain in bodily health than in mental. The theory of monarchical government, which was increasing in power daily in the French mind, was weakened in practice by the spectacle of these two debilitated men. The country was in active quarrel between those great families who sided with the Reformers and those who maintained the defense of Catholicism, while the Crown was at times nothing but a pawn in the hands of either. It must not be supposed that the division really lay along philosophical lines. Nothing was commoner than for a man to appear first upon one side and then upon the other; but the progress of the Reformation was producing such an effect throughout Europe that its principles made a convenient line of division for warring factions. Meanwhile the populace, whom these factions of the upper class confused, were very strongly in favor of the national tradition and consequently increasingly hostile to the Reformers. The feeling became acute in the town of Paris, where the adherents of the Reformation were very wealthy and powerful and into which were already beginning to crowd those who expected a political or diplomatic career. The natural jealousy of wealth, coupled with the indignation against the new theories (which were openly placarded in the street, often in the form of violent insults to the popular religion) led to the explosion known to history as the Massacre of Saint Bartholomew, a piece of bloodshed which, though it was less in extent than many, must rank in history as one of the great Parisian days of violence and takes its place beside the attack upon the Commune and the Massacres of September. (See BARTHOLOMEW, MASSACRE OF). How far the queen mother took advantage of the popular exasperation against the Huguenots, it is quite impossible to say. The legend that the king fired a shot by way of signal has been exploded, but it is probable that the sympathies of the court in favor of suppressing one or other of the factions were sufficiently strong to have led to active intrigue and it is equally probable that the popular feeling was let loose by the Crown.

Whatever the causes — and they will never be fully determined — the effect of the Massacre of Saint Bartholomew was to make Protestantism impossible as the national religion of the French.

But some years later the death of the remaining son of Catherine de Medici, brother and heir to Henry III, who since 1574 had been on the throne, left no male descendant of the Capetain house save Henry of Bourbon, the son of the king of Navarre, to whom he immediately succeeded. Now the house of Navarre had, through the influence of Henry of Bourbon's mother, supported the Reformation: not in its moral aspect but as a piece of protest against the central authorities of Europe. Henry of Navarre had no great attachment to the system on its political side, none on its theological, and an active dislike of it in its moral aspect. He was for his friends a hearty liver, for his enemies a libertine and above all a highly successful soldier. The town of Paris under the influence of the family of Guise went so far in its hatred of the Reformation as to refuse the quite unchallengeable claim of Henry to the throne, because his name was connected with the Protestant side and because in the recent civil wars those who were now the members of his army had in the main been fighting for the Reformation. Under the authority of what was called "the League," Paris refused to accept Henry of Navarre's heirship to the throne and when in 1588 Henry III, the reigning king, had procured the death of the Cardinal Guise, and, being excommunicated for that act, joined Henry of Navarre and took refuge in his camp, Paris declared not only against the succession of Henry of Navarre, but also against the reigning and legitimate king.

In August 1589, that king was stabbed and killed by Jacques Clement. Henry IV, as Henry of Navarre must henceforth be called, was successful in the field, but was unable to take the capital; and his final admission within its walls must not be ascribed to purely military success. It was rather his personal character which gave him popularity in every circle that he led, whether military or civil, his tenacity and the growing absurdity of the attempt to put a subject upon the throne, as well as the adhesion of the remainder of the country, that slowly converted Parisian opinion. Henry IV was ready to meet this process of conversion halfway. Within four years of Henry III's death (in July 1593), he abjured heresy at Saint Denis just outside the walls of the capital and next year was secretly admitted by night. The Pope accepted his reconciliation with the Church; he became immediately popular with the town of Paris and from this date begins his true reign over the French people.

The first and most turbulent period of the religious quarrel in France ends with the Edict of Nantes, signed by this monarch in 1598. It is a document of capital importance, the first of the three great steps by which modern religion has been affected in France. These three steps are: The Edict of Nantes, its revocation less than a century after it was promulgated; and the virtual secularization of the state by the French Revolution. This last, or the third step, in its turn has been followed by a reaction toward Catholicism.

The Edict of Nantes was remarkable in several ways: It was the first and almost the only document to grant religious toleration in its time. For three generations during which it was death to say mass in Protestant England, a Protestant in Catholic France enjoyed all the facilities of a citizen and many special privileges as well. The principle was recognized that if a religion alien to the body of citizens was tolerated at all, it must be tolerated as a privileged and exceptional thing. The Huguenot body, which was then somewhat more numerous than it is to-day and may have amounted to 5 per cent of the population, was not only permitted to hold any office but was allowed to organize its family life, to hold gatherings at regular intervals; to decide upon the attitude which it should maintain toward the rest of the State; and even to possess special towns as its places of refuge. The settlement was not wholly successful, as will be seen by what follows; but though it worked under an increasing strain, it was not definitely put aside until the reign of Louis XIV; and the two other generations during which it was in vigor nourished, the small but wealthy Huguenot body, permitted it to strike deep roots and to become what it still is, though it has dwindled in numbers — a powerful distinct element in the midst of the French state.

With this date, 1598, and with the signing of the Edict of Nantes, much more than with the end of the reign, the next period of French history may be said to begin.

After the settlement effected by the Edict of Nantes the energies of Henry IV were given up, as his temperament demanded, to aggrandizement, for it is remarkable that all those who acquire power over the French are tempted in a short time after that acquisition to theories of military expansion, finding in their hands the best material in Europe for such a purpose. The plan of Henry IV was clear enough and though it has been termed immoral was none the less patriotic. He proposed a destruction of the only strong and centralized power opposed to his own, that of the house of Hapsburg, and he would have accomplished this at one stroke by the use of a powerful army, after which it is just possible that he intended to assume the headship of Europe and to impose peace. In this task or ambition he was aided by the great Sully, a man avaricious in temperament, orderly, careless of divine things, but undoubtedly courageous. The plan of the war was to help the petty German principalities in their attack upon the central power of the emperor. The greater part of these petty principalities were naturally Protestant, for Protestantism had been for them the religious aspect of their political claim. Germany was therefore supporting them against their traditional authority, whether civil or religious. All was ready for the expedition, when on 14 March 1610 Henry was stabbed by Ravaillac on his way to visit Sully at the Arsenal. Many prognostications and omens had foretold this murder, the motive of which was the popular exaggeration that Henry's plot involved a war against the Pope himself and the Catholic Church. Henry was succeeded by his son Louis, the 13th of that name, then in his minority. The queen mother, Marie of Medicis, was regent. She ruled with great individual power and singular energy, but perhaps with insufficient judgment. And the point was of importance because all Europe was then in the great settlement of the quarrel which the Renaissance and the Reformation had aroused. In England itself a great civil war was about to break out, primarily oligarchic in its origin, that is, having for its motive the determination of the squires and the big shopkeepers and merchants to govern the common people and to oust the king. But France remained the arena. The Protestants were immensely powerful; they had cities of their own, forming as it were a state within a state; they were still very numerous (forming perhaps a quarter, perhaps a third of the well-to-do classes), and the generation which could remember, whether in France or elsewhere, the old unity of Europe in philosophy and government was dead. The force of Protestantism in France lay of course upon the side that Protestantism took all over Europe, against central monarchy, in favor of oligarchic theories, and of the independence of the great landowners and of the great merchants. Had the first years of Louis XIII's minority been under the hands of some one strong man, France might at once have become the one thing or the other. As it was sufficient interval was allowed for the Huguenot theories of independence to take root. It was not until 1617 that Louis XIII, now in his 17th year, began to act upon his own initiative. Much at the same moment there appears in French politics the great personality of Richelieu (q.v.). He was of the squires family, by name du Plessis. He had been trained to the Church, was poor, but had sufficient influence to be made bishop at the age of 22. The meeting of the French Parliament or States-General in 1614 (when he was not yet 30) had brought him into some prominence, for he was a member of the House of the Clergy. Two years later, in 1616, the queen mother, with her keen Italian eye, picked him out for the ministry. From that moment he is the principal figure in France. A quarrel which Louis XIII engaged in against his mother eclipsed Richelieu for a moment, but when that quarrel was appeased she used her influence to have him made cardinal (in 1622), and in 1624 he entered the Council of the King, never to leave it, and to direct it during the remaining 16 years of his life with despotic power.

Richelieu, like all men who count in history, had a very simple plan, if it may be called a plan at all. He was determined to aggrandize the material power of the nation. He had, as have also all great men in history, not a simple but a highly complex and subtle appreciation of the medium in which he lived. To him is due that «rediscovery of the national soul,» which in France is only satisfied by unity and rapid centralized measures. He made short work of the Huguenot pretension to maintain within the state a body of rich men defying the authority of the state. He took, after a most gallant and savage defense the Protestant stronghold of La Rochelle, in spite of the active aid of foreign enemies, whom the Huguenots had at once summoned to their aid, and by the Peace of Alais in 1629 he destroyed their conspiracy. He left them, however, complete liberty of conscience, a stroke of statesmanship as wise as it seemed (at that moment) enormous and paradoxical. At that moment and for long years afterward it was death to say mass in England and no Englishman could have understood the ideas of toleration at all. Neither did any Frenchman understand it as an idea, and Richelieu probably thought it illogical himself, but he forced it on the French in spite of civil war, as a measure of statesmanship.

He was not content to destroy the root of rebellion; he was also determined to destroy what was left of the ambition of the squires, apart from any religious or philosophical attitude their class might have adopted. He took the occasion of an excess in the practice of duelling to execute more than one great Catholic noble who persisted in flouting his decree against that habit; in a word, before the outbreak of the civil war in England, he had made of France one united country in which the power of government was observed by all, and in which all tendencies to oligarchy had been utterly destroyed.

Abroad his policy was naturally the very opposite. As he had desired to strengthen France, so he desired to weaken her rivals. With this object he ardently supported all tendencies to division beyond her frontiers, and notably the claim of the German Protestants against what had a hundred years ago been the common civilization of Europe. There had broken out in Germany in 1618 the war known as the Thirty Years' War (q.v.) in which the small Protestant parcels, notably those whose conversion to Christianity was recent and whose foothold in European civilization was still insecure, had determined to break off from that tradition by the sword. Their cause was hopeless in Germany itself, but Richelieu threw the whole weight of French influence upon their side. In about 1635 the empire and the old traditions of unity were completely successful, and in the same year France declared war against the empire. The Spaniards invaded and were with difficulty repelled, but in the next few years the French armies occupied the Roussillon (which is now the Department of the Pyrenees Orientales), and when Richelieu died in 1642 and, some months after him, the king, Louis XIII, a definite French success was approaching. The young, brave, eccentric and somewhat taciturn prince of the blood, Condé, then Duke of Enghien, delivered the fortress of Rocroy on 19 May 1643, and five years later in company with the great Turenne, he accomplished for his country after the most striking military successes, the Peace of Westphalia, by which, in 1648, the Protestant principalities,—and notably, the sandy wastes whence has sprung the kingdom of Prussia,—were created independent units, and the power of the Austrian Empire and of the old traditional central authority in Germany finally wiped out.

The centre of the 17th century, like the close of the 16th and like the year 1515, is a date upon which all historical students should repose. Another stage in the great quarrel was accomplished and the schism of Western Christendom was signed and sealed. Within a few months Charles I was to lose his head and the English were to lose forever the conception of monarchy and, perhaps forever, the sentiment of civic equality. Germany, though destined perhaps ultimately to be reunited, was for 300 years left torn between the old Roman civilization and the barbarism of the north. France, the agent of this vast Protestant establishment, had, so far as domestic politics were concerned, welded her unity, re-established her own traditions and crystallized into the highly definite modern form, which she not only preserves to this day, but seems destined to preserve indefinitely. There was not yet a code of laws, the old gimcrack pretensions of the nobility were still strong, but the whole spirit of the people and of their literature had become again egalitarian and Roman, and the destiny of the next century and a half might be predicted from the Peace of Westphalia.

Meanwhile Louis XIII was dead, a little child six years old, another Louis, his son, was upon the throne. The regency was again in the hands of a woman and when this great development before mentioned was in process, the government was in the hands of Anne of Austria, the queen, and of her favorite, an Italian of great subtlety and low birth, known to the French as Mazarin (q.v.).

Mazarin was not only lowly born and subtle; he was also extremely fond of money. But he had all the Italian conception of what is august; he had inherited the tradition of Richelieu; he maintained it, not nobly but by successful intrigue. He managed to wear down the tendencies of revolt on the part of the nobles which still remained (the greatest French generals, Condé and Turenne himself mixed in that revolt) and when he came to die he left to the boy, Louis XIV, then but 23 years of age, a complete inheritance of a thoroughly successful foreign policy (the Peace of Westphalia was 13 years old); an altogether independent personal despotism in the hands of the king, and a nation so organized in literature, in self-appreciation and in common morals as to form a completely homogeneous body in the Europe of its time. With that year (1661) in which Mazarin died, corresponding within a few months to the restoration of the impoverished, undignified and salaried monarchy made in England, begins in actuality the peculiar and (in the eyes of contemporaries) the glorious reign of Louis XIV. A boy of 23, as has been said, on his virtual accession, he reigned until 1715, a period of 54 years, and from the habits of the generation formed in that space of time, descend the 18th century and the Revolution in France, and, in a sense, modern Europe.

The reign may be conveniently regarded in three periods. The first, of 17 years, covering Louis' active manhood and taking one to his 40th year, was principally composed of successful warfare. And the Peace of Nimeguen in 1678 terminated a successful and advancing struggle against what had become a coalition of the smaller powers against his throne. From that period till close upon the end of the century, the very rapid perfecting of French life which was setting, as it were, into a clear classical form, tempted him to that great sin of every French leader, which is ambition. With such armies and with such an intelligence as his allies, he began to dream. There was even for a moment a danger of the French Church becoming national and losing the spirit of Catholicism. The combination against him continued to exist, and in the midst of this period the final victory of the English aristocracy over the Stuarts threw a heavy weight into the scale against Louis XIV. He was a man of strict honor, and his policy as well bade him support the claim of James II and of James II's son. He had against him, therefore, from 1688 onward, the whole force of the governing power in England as he had already had against him for 20 years the whole force of the governing power of Holland. To this period also belongs (in 1685) the most disputed act of the whole reign because it was the one which most nearly touched the interests of those opposed to the French people, the interests of their philosophy that is, and by philosophy alone do communities live. This act was the revocation of the Edict of Nantes. From that date it has been a fixed article of French policy that the state shall be one, and that no power within the state shall be permitted to exist. There was a vast outcry against the victims of this determination for unity; logic demands that a similar outcry should be raised against the persecution of the priests under the Revolution, of royalists under Napoleon, of the religious orders in modern France, and of countless other instances of minorities which this cardinal principle has caused to suffer. It was not of course a personal act of Louis XIV, it was but one further stage in the maturing of that principle of absolute unity, which had been growing in the French mind since the opening of the Middle Ages, and which had acquired such open symbols upon the accession of Henry IV.

In the third period of his reign, as an old man, Louis XIV engaged upon the last great struggle of his life. The king of Spain, Charles II, had left the crown of that country by will to the young grandson of Louis, Philip, Duke of Anjou. This was in 1700. It was debatable whether Louis XIV should accept this onerous honor or not; he determined to accept it.

It must be remembered that until within living memory monarchy was a real political principle. Those who now exercise the function make us forget what a very real thing a reigning family was up to the moment when the French Revolution had worked out its full effect. For members of one family to rule over France and Spain at the same time had something of the same effect on contemporary imagination as would have to-day the declaration by one great power that it was determined to annex the territory of another. War flamed at once throughout Europe. It was one of those contests in which the French nature was in real peril and in which defeat seemed certain; one of those contests of which the two other historic examples are the invasion of Henry V and the German war of 1870–71. Upon this occasion, however, there was toward the end of the struggle a rally which prevented the consequences that followed upon the earlier and upon the later occasion, and when the Treaty of Utrecht was signed (as well as those of Restadt and Baden) in 1714, the honor of the country and of the monarchy was saved. All that was lost by France was colonial territory. The next year the old king died, leaving for successor a little child, his great grandson, who is known to history as Louis XV.

During the minority of this child France was in the hands of the Duke of Orleans, acting as regent. The regent had many qualities that we admire in man, especially that of courage. He was a gentleman, and thoroughly generous; but he was a libertine, and this weakness of sensuality marred both the dignity of his position and the efficacy of his government. His counsel, the Cardinal Dubois, was probably most unworthy, but one must be careful not to exaggerate one's impression of him, for the attack upon authority was already beginning, and the fact that Dubois was in orders was quite enough to make the intellect of his time emphasize his vices. After a period of violent speculation and of great though perhaps exaggerated public distress, the regent died, having held his authority for eight years.

From that moment (1723) Louis XV began to reign.

Nothing is more difficult than to estimate the character of this man. It cannot be denied that upon this character the history of France during the next 70 years largely depended. For the monarchy was still real and absolute and the method in which it was conducted was the chief factor of the national destiny.

The writer of these lines has minutely examined the acts, the portraits and the handwriting of Louis XV and in relation to a monograph concerned with that period has made himself thoroughly acquainted with the personality of the man; and yet he finds it very difficult to give a true judgment. He was profoundly Christian, with a fervor of religion that verged upon superstition; he was undoubtedly courageous, somewhat sensual, in old age excessively so. On the other hand he suffered from an impediment of the will. To say that his will was weak would be to convey a very erroneous impression. But there were a certain number of things he could not bring himself to do and chief of these was the exercise of authority face to face. He hated and avoided all interviews and all scenes. In his character of gentleman this was well enough, but in his character of king it was fatal. The first war of his reign was upon the whole glorious. And the Treaty of Vienna, signed in 1738, gave France the reversion of Lorraine. But two years later the principal quarrel of the century and the most important event, in its effects between the English Revolution and the French, took place. This was the death of Charles VI, the emperor of Germany, who left as heir his daughter Maria Theresa. The German anarchy was at once aroused. The attempt to destroy the empire virtually was begun by the Protestant princes, and notably by the rising power of Prussia. At this moment a clear error, one of the very few with which French diplomacy can be reproached, was committed. Two centuries of tradition proved too strong for the French intellect, and the French armies were allied with those of the petty prince and of Prussia against Austria. The origin of the war was marked by the first of those scandalous acts which have brought European civilization into such peril during our own time. Frederick II of Prussia, a man subject to every vice, with the exception of cowardice, seized Austrian territory without title and without any declaration of hostilities. It was the act rather of an Asiatic than of an European. But the French monarchy, whose whole history had been a protest against such a perversion of public morals, found itself in alliance with this detestable soldier. The alliance was not unsuccessful, and the war which followed will be forever famous in French annals from the great victory of Fontenoy on 11 May 1745, a victory largely due to the Irish exiles who fought under the French flag. The Peace of Aix-la-Chapelle signed in 1748 did not show the fruit of so much military valor and success; it left France very much as it found her. But the struggle with its false issues and its vanity had luckily converted the French diplomats, and henceforward France wisely associated herself with Austria, with the especial purpose of meeting the rising power of England. Had the French forces been confined to the struggle with England, their success, which was already great at sea, would probably have been final, and the strange spectacle would have been presented in our own time of a France weighted with eccentric, un-European colonies, and probably deprived of its whole national spirit and tradition. The reason that we have no such spectacle to enjoy or deplore is that the government of Louis XV, not content with fighting England abroad and at sea, undertook a continental campaign, and fought side by side with Austria in what is known as the Seven Years' War (q.v.). At the very beginning, in 1757, Frederick of Prussia inflicted a crushing defeat upon the French at Rosbach, a defeat entirely due to the ineptitude of the French command. Meanwhile in the colonies the French lost and the English won. And in 1763 the Treaty of Paris was signed, which for a century destroyed all French effort oversea, left Canada to the English, abandoned India, and, what was graver in the history of European morals, permitted Frederick of Prussia to retain Silesia, thereby acknowledging in a public instrument for the first time since the foundation of Christendom that lawful succession and inheritance might be waived in presence of force. From this grave crime Europe still suffers. It was the precedent of all the international anarchy which our generation has almost become accustomed to.

The remaining 11 years of the reign were passed in peace, but in dishonor. The nation was profoundly troubled in its pride as in its economic circumstances. The heir to the throne was a lanky, very stupid boy, the grandson of the old king, and men saw nothing in the immediate future for their relief, though the death of Louis was looked forward to as to an event for public rejoicing. He passed, after a few senile years of debauchery, in 1774, and his grandson, Louis XVI, who had been married as a boy (four years before) to the youngest daughter of Maria Theresa, Marie Antoinette, ascended the throne. On the same day the Boston Harbor Act was proclaimed in the American colonies. It is quite impossible in a few short notes such as these to prepare the reader for the enormous convulsion through which France and all civilization was now about to pass. It is enough to say that the mind of that generation was by this time securely fixed in a clear and intense conviction: that lucid, mechanical and direct methods capable of reasonable analysis were in all departments of human energy the only ones which man as a moral being could entertain. It followed that all merely organic things were in peril, the old and merely traditional constitutions of the country, and of course religion. The Catholic faith had never been at so low an ebb since Constantine; its power has been returning for a century, and it is difficult for our generation to understand how completely the faith had disappeared just before the French Revolution broke out. The first years of Louis XVI were occupied with a renewed struggle against England, which struggle was successful beyond the dreams even of those who most ardently supported the policy of attack. French guns had been supplied to the army which conquered at Saratoga shortly after a French fleet rendered possible the surrender of Yorktown; and it was imagined both in England and upon the Continent (such is the impossibility of foreseeing the future) that the power of Great Britain was finally extinguished. Meanwhile, the American colonies and their ideal republic furnished an object lesson, as it were, to the rationalism of the time. And the public mind was moving very rapidly indeed toward a reconstruction of society. The moral equilibrium was utterly unstable. It needed but some material cause for that equilibrium to be upset, and for a new society to arise. This cause was presented by the condition of national finance. France was a very wealthy country and like all the rest of society at that moment was rapidly increasing in wealth. But the methods of taxation were grossly imperfect, the burden fell upon the wrong people and was imposed in the wrong way. So that France could with difficulty furnish a sum equivalent to no more than $5 per head of its population, where recently it furnishes with the utmost ease close upon and often exceeding $20 a head. An assembly of the notables of the kingdom was summoned in 1787 and did nothing. And finally in 1789 was convoked the first great democratic parliament ever seen in Europe since the Middle Ages had declined. The experiment was watched with alarm, especially in England where the conception of popular government was mistrusted and disliked, not only by the ruling oligarchy but by the people themselves. When the assembly had met, which was in the May of that year, the commons proceeded to claim in practice complete power in the state. They had for their ally the city of Paris, without whose energy and courage their rhetoric would indeed have been vain. The mobs of the capital proved incapable of withstanding regular troops. That was the chief and least un[illegible]stood aspect of the Revolution. Nor can any [illegible] unacquainted with the military temper of the French people comprehend the movement. It was, for instance, Carlyle's principal error that he imagined a display of public force sufficient to check the Revolution. Public force was used to the utmost, and failed because the people were in a mood of indifference to suffering and to death, a phenomenon so rare that, save in Ireland, the modern world has seen no example of it. It is possible that a democracy would have been established and that the names at least of certain great traditional functions in the state would have been preserved, and that the Revolution would have ended in a compromise, had there been no foreign war. As it was, the attack made upon the organization of religion, and the attempt to withdraw the Catholic priesthood from their normal organization and to make of them a civil service, coupled with the perpetual indignities offered to the king and queen, and added to the ceaseless effects of violence, moved Europe to interfere. The method of this interference was cautious and long debated, but the threat of it was enough to goad the French people. In June 1791 Louis XVI and his wife and children fled to the frontier and were recaptured. Two months later Austria and Prussia publicly agreed upon a policy of intervention, though even at this late stage the agreement was conditional, and so far as we can judge by the private letters exchanged in that autumn, the idea was rather to overawe the French democracy by a display of invincible force, than to proceed to actual invasion. In the winter, largely through the action of Marie Antoinette, Austria, ruled by her brother, proceeded to impose minor but direct commands upon the French policy. In the spring war was declared. The allied armies did not cross the frontier until the height of summer, but it appeared certain that they would be in Paris by the end of August, for the disorganization of the French army was complete and it was quite incapable of making a stand. The invasion was accompanied by a manifesto drawn up by advice of Marie Antoinette (who was probably the author of its principal threat) and this manifesto devoted the town of Paris to military execution, if the persons of the royal family were not left inviolate. The answer of Paris to this document was to storm the palace on 10 August. The building was well defended by a powerful force of 6,000 men, and it was the opinion of Napoleon Bonaparte, who seems to have been an eye witness, and who was certainly an excellent judge of military affairs, that the military chances were in favor of the Crown. The mob fought with the utmost courage, losing men in numbers variously estimated at 150 and 3,000;— the latter is the nearer computation, for though the losses were heavier of course upon the defeated side, the services of numerous carts and carriers were required for the whole day and the succeeding night in removing the dead. At any rate the populace were completely successful. The royal family was imprisoned and a committee of extreme democracy, the chief of whom was the learned but impetuous Danton, took over the management of the country in the face of the enemy. That enemy proceeded without obstacle, forced the three passes of the Argonne, and met such forces as the French had scraped together on much the same ground as had seen the struggle against Attila, the great plain now occupied by what is called "the Camp of Châlons." The centre of the French position was the windmill of Valmy. What followed is a singular lesson in strategics. There was, properly speaking, no battle. A distant cannonade and an abortive charge made up the whole action. But precisely because the Duke of Brunswick did not press his power home Valmy had all the effects of a thorough defeat. A retreat was negotiated, and from that day, the equinox of '92, the Revolution took on its final phase. The republic was declared, the trial of the king was prepared, the army though still undisciplined and unmilitary gained the haphazard victory at Jemappes, and poured over the frontier into Belgium. On 21 Jan. 1793 the king was executed; within a fortnight Holland, England and Spain, one may say the whole of Europe, was at war with France. The volunteers and other hotch-potch under Dumouriez in Belgium were defeated; at Neerwinden, Dumouriez betrayed the country and ultimately accepted a large salary from England, whose strategy he advised and overlooked, and the French Revolution, for the second time in peril, established martial law. A strict military despotism in the hands of a small committee, known as "The Committee of Public Safety," governed France with ruthless severity for 16 months, defeated the enemies of the country and began that marvelous series of victories which within a generation transformed the world. During those 16 months the committee was changed; but its principal names give it unity from first to last, and in its latter stages the name most upon public lips was that of Robespierre (q.v.). Robespierre did not command the committee. They were at first jealous of him and toward the end of the period he hardly attended their meetings. He was a man of many virtues, of a high political idealism, and of conspicuous sincerity and candor, but he suffered from the vice of ambition. He loved the popular idolatry that surrounded him, and used it as a lever against the committee. This committee, therefore (in which he had but two friends), being essentially military in its nature, and occupied principally in the military problem of repelling the foreigner, determined to be rid of him. They planned his destruction, and Robespierre was outlawed and guillotined on 28 July 1794.

It so happened that the period of his great popularity had coincided with the height of the revolutionary delirium. Three-fourths of the country was in revolt. Savage acts of repression had followed the crushing of the rebellions and "the Terror," as it was called, had come, very falsely, to be associated with Robespierre's name. When he fell, therefore, the committee found to their astonishment, that his fall was taken as a signal for the relaxation of their military power. From that date (called in the new revolutionary calendar "the Tenth Thermidor") the active portion of the Revolution ends. It had succeeded in finally establishing the theory of democracy.

In the next year it achieved its most diplomatic success, and imposed peace upon its enemies at Basel in a treaty which considerably enlarged French territory, and shortly afterward the public assembly which had accomplished this great result was dissolved. England and Austria alone remained at war. Against the second was dispatched into the Plains of Lombardy a young Corsican who had but lately been given his brigade, and who was but 27 years of age. This man was Napoleon, and from that date, 1796, the history of France begins to be a record of his exploits.

See Clovis; Charlemagne; Charles Martel; Pepin; Paris; Crusades; Hundred Years' War; Joan of Arc; Henry of Navarre; Guise; Edict of Nantes; Henry IV; Sully; Louis XIII, XIV, XV, XVI; Richelieu; Thirty Years' War; Condé; Turenne; Mazarin; Maria Theresa; Seven Years' War; Frederick II of Prussia; Marie Antoinette; Mirabeau; Danton; Robespierre; Marat; Girondist; Reign of Terror; Napoleon; France — Church and State; Great Britain — French Wars of the 18th Century; United States — The Revolution; Italy — Modern History; Germany — Political History; Austria, and the various personages and events mentioned in this article See also French Revolution.

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3. FRENCH HISTORY FROM THE REVOLUTION TO THE ESTABLISHMENT OF THE EMPIRE, 1796–1804. This period is one of the most important in the history of France, and from beginning to end its every event centres about one man, Napoleon Bonaparte. From the outset Napoleon was greatly hampered. There was much popular unrest, for the people had but recently emerged from a bloody revolution and were clamoring for they knew not what. The main foundations of democracy had been laid, but the fundamental principles of civil and religious liberty cherished by the French people, equality of rights and the sovereignty of the will of the people seemed as yet insecure; petty jealousies, conspiracies, plots and counterplots dominated politics. The government was internally weak and engaged in a struggle for its very existence; the directors, honest men enough, never were in harmony; suspicion and distrust of everybody and everything pervaded the atmosphere; the finances were in a disgraceful condition. The nation, weary of internecine warfare, sick of bloodshed, longed for permanent peace and a renewal of industrial and economic activities. But industry and commerce seemed dead, or at least in a hopeless state of stagnation. Bankruptcy overwhelmed the bourgeoisie; the laws were unsatisfactory and, poor as they were, remained unenforced; the army, though re-enforced, following the Revolution, was in a very bad condition, ill-fed, poorly clad and lacking a controlling hand; and relations with foreign nations were strained to such an extent that war threatened on every side. The aggressive policy of an unstable government bade fair to lose to France the glory of her recent conquests. War seemed now to be the only means of replenishing an empty treasury and confirming the glory of the nation through the work of her military commanders. The first significant step in Napoleon’s path toward power was the placing of the armies of France under his command and at his disposal. Thus the opportunity was within his grasp and the means provided whereby he could carry out his personal ambitions and, at the same time, promote the progress and welfare of the entire nation. Possessed of great wealth, acquired by plunder, Napoleon was enabled to supply the directory with much needed funds and to bend the will of that body to his own ambitious ends. Peace-loving Frenchmen grew to place fullest confidence in this irresistible chief of the army. That this revivified military force and its ambitious commander should ever become a menace to the designs of the directory and of the citizens of France was not contemplated. Whether or not his love for the country or his commiseration for the pathetic state in which he found her were secondary in his mind to his personal aggrandizement matters little. It is certain that from that time the destiny of France was indissolubly linked with his rise and fall. Upon his success or failure depended the continuance of the French entity. His plans formed the institutions of the country; his wars made French history and changed the face of the land. Aware that upon the applause of the nation rested largely the success of his ambitious projects, Napoleon endeavored to obtain the good will of the public and to then conform it to his wishes. Loving liberty, the French people yet gave enthusiastic support to a commander who detested liberty for any but himself. Crying out for equality and fraternity they yet upheld a leader whose predominant thought was to impose his absolute will upon all others through every means at his command, and whose vision was that of absolute power. France and her conquests he used to further his own project. Yet he was not insensible to the ideals of the Convention and of the directory; on the contrary he was greatly influenced by them. His lust for conquest may partly be attributed, no doubt, to his desire for the glory of the republic and the success of her ideals. These invigorating ideals of nationality and democracy he carried with him into Italy, breathing life and purpose into the beginnings of that wonderful movement which culminated in the events of 1870 and the birth of the Italian nation. From that time his master mind and subtle genius and mighty hand were the most potent factors in raising France from the pit of anarchy and degradation to the heights of pride as the most powerful nation of the world; from that time his history was French history — Napoleon was France.

The French Revolution has been characterized as «The most important event in the life of modern Europe»; it has been compared to the Reformation and to the rise of Christianity, because, as in both of these great movements, it set forces in motion which changed the thought and life of men and permanently affected human civilization. The sovereignty of the people, personal liberty, a new idea of nationality were three principles that were awakened in the minds of men. . The bloodshed and treasure spent and the unrest of Europe were but the prelude of a brighter day when order should come out of chaos, peace be restored to the nations, feudalism destroyed, social equality advanced and great national movements made possible.

The life and work of Napoleon in the Restoration, whatever may be our judgment of his motives and his purposes, have always been a subject of profound study for the student, for there is scarcely any department of human activity that he did not touch and influence. History, religion, politics, education, law, government, political and industrial economy and social reforms were all subjects for his wonderful energy. One of the most versatile characters of history, his reorganization of France was one of his greatest achievements.

In order to understand the conditions existing at this time and to follow the steps by which Napoleon attained his remarkable position we must go back into the reign of Louis XVI and study the events which resulted in the Reign of Terror, the Revolution and the establishment of democracy.

Louis XVI, son of the Dauphin and grandson of Louis XV, ascended the throne on the death of the latter, 10 May 1774. Hardly had he been crowned when war broke out with England, in consequence of the support afforded by France to the revolted American colonies of Great Britain. A treaty of commerce and alliance with the United States was signed 6 Feb. 1778, and was followed by an immediate declaration of war by England. The war was successful in its immediate object and was terminated by the Treaty of Versailles, 3 Sept. 1783. Three years afterward a commercial treaty was concluded with England. The first difficulty of Louis' government, however, and the rock upon which it split was the hopeless and unmanageable condition of the public finances. Maurepas, Turgot, Malesherbes, Clugny de Nuis, Necker, Joly de Fleury, d'Ormesson, Charles-Alexandre de Calonne, Loménie de Brienne and others signally failed to ward off impending disaster and resigned or were dismissed. Finally the king was forced to convoke the States-General (q.v.) at Versailles 5 May 1789. Owing to disputes between the three parties represented — the nobility, the clergy and the Third Estate — the attempt to solve the difficulties was abortive. The king assumed a hostile attitude and committed several acts which angered the public, the chief of which was the dismissal of Necker, who a second time had been called to the financial portfolio; and in June 1789 it became necessary to bring foreign troops to Paris to overawe the assembly. The people demanded arms and the Hotel de Ville at Paris supplied them; blood was shed there on 12 July; and on the 14th the Bastile was captured and destroyed. The *garde bourgeoise*, formed by the municipality, was now transformed into the national guard with Lafayette as commander. The spirit of insurrection in the meantime had, since the beginning of 1789, been spreading in the provinces; sections of the country were swept by a panic called the «Great Fear,» and the urgency of affairs induced the assembly, on 4 August, to take a decisive step. On the basis of a future compensation all privileges were abolished. A banquet given to the foreign troops at Versailles, at a time when the populace was threatened with famine, excited another insurrection. Versailles was attacked by the mob and the king brought a prisoner to Paris (5 and 6 Oct. 1789).

In December 1790 the king began to correspond secretly with foreign powers and a secret convention had been made with Austria, Prussia, Piedmont, Spain and Switzerland to advance their troops to the frontiers with a view to a simultaneous occupation of the territory. Louis made his escape from Paris (20 June 1791) and endeavored to reach Montmédy; but he was recognized on the road, arrested at Varennes and brought back to Paris escorted by the commissaries of the assembly. A demonstration in the Champ de Mars in favor of his deposition (17 July) was put down by force by Lafayette and Bailly under order of the assembly.

On 30 Sept. 1791 the assembly brought its work to a finish. The constitution was sworn to by the king on 14 September, after which he was reinstated in his functions. The constitution embraced all those civil reforms which, afterward incorporated in the code of Napoleon, survived the political changes of the Revolution. It deprived the king of arbitrary powers and voted him a civil list; it provided liberty of worship, freedom of the press, of commerce, of industry; the laws of primogeniture and entail were abolished and equal division of property among children made compulsory; confiscation of property for offenses was abolished and personal punishment substituted; titles were abolished; the clergy were reduced to public functionaries, salaried by the state; the territory of France was declared free through all its extent and a redivision of it was effected (15 Jan. 1790) in 83 departments. This division afterward proved an admirable instrument of centralization and in repeated emergencies enabled Napoleon at once to lay his hand with ease upon all the military resources of France. One of the measures already mentioned in particular demands further details, as it was the means of meeting the financial difficulty and at the same time of arming the enemies of the Revolution, at whose expense it was effected. On 2 Dec. 1789 the domains of the Church were, in the euphemism of the assembly, put at the disposition of the nation. The minister was authorized to sell these estates to the extent of 400,000,000 livres. Until the sale was effected he was authorized, on the security of these national domains, to issue a paper money having a forced circulation and a preference in the purchase of them. In 1792 the estates of the émigrés were confiscated in like manner. Thus was created that seemingly inexhaustible treasury of assignats which brought France so speedily into a financial anarchy worse than any she had yet experienced. Among other reforms was the reorganization of the administration of justice. The parliaments were dissolved by indefinite prorogation and judicial functions were separated from the administrative; district courts were created and judges appointed for 10 years. The assembly closed with an attempt to recall the émigrés and it prohibited the reelection of its members. Mirabeau, the greatest orator of the assembly and one of the boldest leaders of the Revolution, had died prematurely 2 April 1791 from the excesses of his life. The constituent assembly was, according to the constitution, immediately followed by the legislative assembly, which began its sittings on 1 October; but before the period assigned by the constitution it gave place to the convention. In the legislative assembly there were two parties of political importance, the Girondists, who led it, and the Montagnards, who subsequently became all-powerful in the convention. The royalists were already powerless. The assembly was compelled at once to take a decisive course. By the declaration of Pilnitz the emperor of Germany and the king of Prussia threatened an armed intervention to restore Louis to his rights. The king was compelled in March to accept a Girondist ministry, and on 20 April 1792 war was declared against the empire. The first attempts to assume the offensive were unsuccessful and the French armies were not even able to prevent the enemy from invading home territory. To make matters worse the king maintained a treasonable correspondence with the allies and refused to sanction the decrees of the assembly. Paris grew restless as the enemy advanced; unscrupulous politicians urged the mobs to violence and on 20 June the people invaded the assembly and the Tuileries and summoned the king to sign the decrees. He refused, but satisfied them for the moment by allowing himself to be crowned with a red bonnet. On 26 July the Duke of Brunswick issued his celebrated and impolitic manifesto, threatening, if the king were insulted, to deliver Paris to a military execution. The sections of Paris retorted by signing a petition demanding the deposition of the king before the close of the day (9 August). At midnight the tocsin sounded. The Tuileries, after a sanguinary combat, was taken and sacked. The king took refuge with his family in the assembly, which was invaded and compelled to submit to the dictation of the victors by assenting to the suspension of the king and the convocation of a national convention. The convention was an extraordinary assembly, summoned for an emergency, and thus recognized the fact that France was again without a constitution. The war now assumed a more favorable aspect. The victory of Valmy, 20 Sept. 1792, caused the Germans to fall back discomfited. The siege of Thionville was abandoned and France was freed of her invaders. Savoy, Nice and Villafranca were seized and occupied by the French; the army of Alsace under Custine took Speier (30 Sept. 1792), Worms (5 October) and Mainz (21 October). Frankfort capitulated to Houchard; and the victory of Dumouriez over the Austrians at Jemappes, 6 Nov. 1792, led to the occupation of Belgium.

The first act of the new assembly, 21 Sept. 1792, was to proclaim the republic. Thus the Year I of the republic began. On 3 December the king was cited to appear before the assembly. On 20 Jan. 1793, he was, by four successive votes, sentenced to death within 24 hours, and on the 21st the sentence was executed. This violent inauguration of the republic shocked public opinion throughout Europe, and armed the neutral states against France. England, Holland, Spain and the empire joined the coalition. A levy of 300,000 men was ordered. It was necessary to send some of these new levies to suppress the Chouan insurrection in Mainz, Anjou and Brittany. Nearly all the officers of rank had emigrated, and Dumouriez, feeling that hostility was rising against him in Paris, resolved to regain his prestige by a bold stroke — the conquest of Holland. He was defeated in the attempt, however, by the Prince of Coburg who administered a crushing defeat at Neerwinden, 18 March 1793. Dumouriez then secretly agreed to evacuate Belgium and turning against the convention deserted to the allies on 4 April. Mainz was also lost by Custine. At home the army lost confidence in its heads and became disorganized. Mutual suspicion and distrust reigned in the convention itself. The convention took measures suited to the gloomy aspect of affairs. A revolutionary tribunal was appointed to try offenses against the state; a committee of public safety, with sovereign authority, was appointed (6 April), and the convention renounced the inviolability of its members. The period thus inaugurated is known in history as the Reign of Terror. The struggle between the Girondists and the Montagnards became violent. The latter, defeated in the convention, armed the sections of Paris. The convention, under pressure, ordered the arrest of 31 Girondists (2 June). Some of them escaped and excited insurrection in the provinces. A new constitution was adopted by the convention 23 June, called the Constitution of the Year I, and the Republican calendar was adopted on 5 Oct. 1793. The energy of the dominant party had risen to the danger, but it was accompanied by a ferocity without example. The revolutionary tribunal had already filled the prisons with victims. On 10 Oct 1793 the constitution was suspended and the government declared revolutionary, a term which included unlimited power. Both in Paris and the provinces executions and massacres followed each other daily, and as new parties succeeded each other in the convention the leaders of the defeated parties were added to the usual list of suspected royalists or reactionaries. Thousands of paid committees were formed throughout France. The queen was executed on 16 Oct. 1793, the Girondists (against whom public anger had been more deeply aroused by the assassination of Marat on 13 July by Charlotte Corday) on 31 October (10th Brumaire), the Hébertists on 24 March 1794, the Dantonists on 5 April. Robespierre had a new law passed on 22 Prairial (10 June) to facilitate these executions, and from this date to 27 July about 1,400 persons are supposed to have perished. At length the Reign of Terror came to an end by the revolution of the 9th Thermidor and by the execution of Robespierre and his associates on 27 and 28 July 1794.

In the meantime the majority of the southern towns declared against the convention. French territory was invaded both on the north and south and to all these dangers was added famine. Condé was taken by the allies 12 July 1793; Mainz surrendered 23 July; and Coburg took Valenciennes on the 28th. The convention fixed a maximum price for the sale of provisions. A decree was passed excluding English manufactures from France. A levy was ordered of 1,200,000 men, and Carnot organized 14 armies. The revolted provinces were speedily reduced. At this time Napoleon first became prominent in France. In September 1793 he was commissioned lieutenant-colonel of artillery and sent to Toulon to assist in the reduction of that city which was then in the hands of the English. By his strategy this was accomplished on 19 December, and Jourdan, in the north, was enabled to give his undivided attention to driving the principal forces of the coalition from the country. During the balance of 1793 and in 1794 the campaigns resulted favorably to the French arms. Jourdan defeated the Prince of Coburg at Wattignies 15 and 16 Oct. 1793. Hoche, after losing the three-day battle of Kaislerlautern (28 Nov.-1 Dec.) and winning the battle of Wissenberg (26 December), wintered in the Palatinate. In Italy and Spain the French had also been able to carry the war beyond their own frontiers. In the spring of 1794 the French armies took the offensive. An attack on Lille by Coburg's forces was repulsed with great loss on 18 May. Jourdan crowned a series of victories by the capture of Charleroi in June; and by the victory of Fleurus (26 June 1794) recovered Belgium; and Pichegru, by the beginning of 1795, had completed the conquest of Holland. A treaty of peace was signed 16 May. Holland, under French influence, constituted itself the Batavian Republic. Tuscany concluded peace with France 9 February. By the successes of Jourdan the allies were driven across the Rhine, and Spain was invaded. These successes induced Prussia and Spain to lay down their arms. By the treaties of Basel (q.v.) signed by the former on 5 April, by the latter on 12 July (ratified 22) 1795, and by Hesse-Cassel on 28 August, these countries acknowledged the French Republic. (See Peace Treaties). The English during this time had been successful at sea and had made extensive captures among the French colonies. Meanwhile (in February 1794) Napoleon had been promoted to the rank of brigadier-general of artillery and later in the same year was sent to Genoa to study its defenses and the political disposition of its inhabitants.

In 1795 the convention gave the republic a new constitution called the "Constitution of the Year III"; a chamber of Five Hundred to propose the laws; a chamber of Ancients to approve them; an executive of five members, one elected annually, called the directory. This tame bequest of that once terrible assembly marked the progress of a strong reaction. The royalists conceived sanguine hopes of a restoration. Pichegru was gained, a royalist insurrection organized, and 30,000 men marched on the Tuileries, where the convention sat. Barras entrusted the defense to Napoleon who had lately returned. He with 5,000 men and his artillery, though he had only a single night in which to prepare, not only repulsed the insurgents but poured such murderous discharges of grape into their ranks that within an hour after actual fighting began he had secured victory for the convention. This event is called the affair of the 13th Vendémiaire (5 Oct. 1795). In recognition of his services Napoleon was now appointed by the convention to the command of the army of the interior. The convention was dissolved on 26 October.

With the suppression of the revolution at Paris by Napoleon, the subjugation of the Vendeans and Bretons by Hoche, the crushing of the "Conspiracy of Babeuf," and the pacification of the other sections of the country came a distinct lull in political passion. For the first time in many years the armies of France were idle and so the directory planned further foreign conquests. Carnot, the "organizer of victory," who was one of the five members of the directory, was depended upon for the military success of the campaigns. He planned an attack on Austria and resolved to strike from three separate points. In 1796 he sent out three armies which were to hem in the Austrians on all sides and descend upon Vienna simultaneously. Two of these armies, each 70,000 to 80,000 strong, were to enter Germany to reach the valley of the Danube, one under Jourdan (the army of the Sambre and Meuse) by way of the valley of the Main, the other under Moreau (the army of the Rhine and Moselle) by way of the valley of the Neckar. Both were then to descend upon Austria. Napoleon with the third army (the army of Italy) 40,000 strong, was to menace Italy. Let us follow this last army.

One object of the campaign was to make the armies live on foreign territories. Bonaparte's lieutenants in Italy were already experienced generals. He assembled them and unfolded his plans, which silenced the jealousy naturally caused by his appointment. To the soldiers he issued the first of his rousing proclamations: "You are ill-fed," he said, "and almost naked; the government owes you much, and can give you nothing. I am about to lead you to the most fertile plains in the world, and to opulent cities where you will find honor, glory and riches." During four years the army had been struggling against the Sardinian and Austrian troops, without decisive success, on the southern slopes of the Alps and Apennines. The Sardinians stretched from the Bormida to the Stura, with an entrenched camp at Ceva. The Austrians were cantoned in the neighborhood of Alessandria and Tortona, commanding the roads to Genoa and Milan. Napoleon threatened an attack on Genoa by Voltri, but made his real advance through the valley of the Bormida. Toward the end of March 1796 he set out from Nice and after defeating the allies at Montenotte (11 April) seized that town and thus placed himself in thir centre. Having first repulsed the Austrians he pursued the Sardinian army, beat it at Millesimo (13-14 April) and at Mondovi (22 April), and drove them before him to Cherasco, where an armistice was concluded (28 April), which was converted, on 15 May, into a definite treaty, by which Sardinia renounced the coalition and ceded Savoy and Nice to France. In the interim Napoleon sent Masséna and La Harpe against the Austrian army and they defeated it at Dego, 14-15 April. Napoleon then, by forced marches to Piacenza, compelled Beaulieu to retreat toward the Tyrol. He crossed the Po at Piacenza, stormed the Bridge of Lodi (10 May) which was held by the Austrians to cover their retreat, and entered Milan on 15 May. Brescia was entered on the 28th; the passage of the Mincio forced at Borghetto on the 30th; and the Austrians, after garrisoning Mantua, retired into the Tyrol. The English were dislodged from Leghorn and Corsica; and Venice, Genoa and Piedmont gave in.

Napoleon followed up his successes by negotiations with the Italian princes and the Pope, upon whom he levied contributions. The king of Naples signed an armistice on 5 June. Besides money, so much wanted by the directory, Napoleon provided a pleasing tribute to French vanity by stipulating for the surrender of pictures, manuscripts and works of art. On Lombardy he levied a contribution of $400,000,000; the Pope promised $420,000,000. He sent $200,000,00 to the directory, which had not been able to defray the expenses of his campaign. While he besieged Mantua, a fresh army of Austrians under Wurmser advanced against him in three divisions. Here Napoleon's ability to grasp a situation quickly and to discover the critical point in a campaign were remarkably displayed and served him well. He raised the siege of Mantua, beat one division under Quosdanovich at Salo and Lonato, 3 Aug. 1796, and another under Wurmser at Castiglione, on the 5th. Wurmser, reinforced to 50,000 men, again attempted to relieve Mantua. Napoleon, who had entered the Tyrol and had reached Trent on his way to Innsbrück, after defeating 25,000 Austrians under Davidovich at Roveredo, on 4 September and winning the battle of Calliano, descended the valley of the Brenta after Wurmser, defeated him at Bassano (8 September), at La Favorita and at Saint George and about the middle of that month shut him into Mantua.

On the other hand the same success had not attended the armies of the north. The Archduke Charles had defeated Jourdan, and forced Moreau, who had penetrated into Bavaria, to retreat by the Black Forest to Alsace which he reached in October. Thus any relief for Napoleon was checked. At this time also a great expedition to Ireland under Hoche failed and that general was recalled to France to serve with one of the other armies. These events enabled the Austrians to send a fresh army after Napoleon, consisting of 50,000 men, under Alvinczy and Davidovich. In vain, however. After sustaining repulses at Rivoli and Caldiero, he outmanœuvred Alvinczy and defeated him at Arcola 15-17 November. In January 1797 Alvinczy, with large reinforcements, again advanced from Roveredo to the relief of Mantua. The French were driven in at La Carona but Napoleon defeated Alvinczy on the 14th at Rivoli, and on 2 February received the surrender of Mantua from Wurmser. On the same day he put an end to his armistice with the Pope and invaded the States of the Church, defeating the papal troops at Senio, and in rapid succession capturing Faenza, Ancona, Loretto and Tolentino. A speedy understanding was reached by the Treaty of Tolentino (19 Feb. 1797). The Pope surrendered Avignon, Bologna, Ferrara and the Romagna to France. These were added to the provinces of Modena and Reggio, taken from the Duke, and formed the Cispadane Republic, as, after the battle of Lodi, Lombardy had been proclaimed the Transpadane Republic.

The Austrians, however, were preparing for another invasion of Italy under the Archduke Charles, and Napoleon resolved to anticipate them before they should receive their reinforcements from the armies on the Rhine. He therefore entered the Tyrol, driving the Archduke before him, and, crossing the Noric Alps and penetrating as far as Leoben in Styria, he had reached Judenburg, a few days' march from Vienna, when an armistice was accepted (7 April 1797) and preliminaries were signed at Leoben on the 18th, ceding the Austrian Netherlands and Lombardy to France, and indemnifying Austria with Venetia. These preliminaries were confirmed by the Treaty of Campo Formio, signed 17 October. While Napoleon was carrying on these stupendous operations, Hoche and Moreau had conducted equally glorious but less successful campaigns against the Austrians in southern Germany and had pushed them back into the Black Forest when they received the news from Leoben of armistice and suspended active operations.

In the meantime the condition of affairs at home was becoming worse. The Reign of Terror had been followed by an excessive dissolution of manners. Brigandage prevailed in the provinces. Barras, a member of the directory, and other high officials had been guilty of malversation and private jobbing in the public funds. The returned royalists were intriguing for a counter-revolution. The reactionary party had triumphed in the elections of May 1797, and had succeeded in electing Pichegru president of the Five Hundred, and Barbé Marbois, another royalist, president of the Ancients, and had replaced Letournerre in the directory by Barthélemy. The majority of the directory, relying on the support of Bonaparte, resolved to anticipate them. Hoche had been recalled with his army from the Rhine and from Italy Napoleon sent Augereau, his trustworthy aide, and with these the directory carried out the *coup d'état* of the 18th Fructidor (4 Sept. 1797). On that night Augereau introduced 12,000 men into Paris, surrounded the halls of the councils and arrested the leaders of the reactionary party. The minorities of the two councils, assembled on the invitation of the directors, condemned 53 deputies to transportation; annulled the elections in 48 departments, and repealed the laws which had been passed in favor of priests and emigrants; and other violent measures were also taken. Moreau, who had betrayed the intrigues of Pichegru, was himself suspected, and deprived of his command; and Hoche in consequence received command of the two armies of the Rhine. Soon afterward, however, he was taken suddenly ill (some say he was poisoned) and died.

It seems to have been the purpose of the directory at this time to invade England and with this object in view a large army had been gathered together. Napoleon was placed in command of it and though at first he professed to favor the design, he readily saw its impracticability and finally persuaded the directory to abandon the project. As an alternative he proposed to ruin the English Indian Empire by the conquest of Egypt. His plan was approved; an army consisting of 36,000 men was equipped; and in a fleet commanded by Brueis the expedition embarked at Toulon on 19 May 1798. In passing they took Malta from the Knights 9–10 June. The fleet, a few days later set sail for Egypt and reached Alexandria 1 July. Napoleon sent Kléber forward to take that city and then advanced on Cairo but before he reached his destination he encountered a large force of Mamelukes. A long and bloody struggle ensued known as the battle of the Pyramids, but on 21 July Napoleon emerged victorious. He then entered Cairo in triumph. Napoleon thinking himself secure set about reorganizing the civil and military government of the country, among other things establishing on 22 August the Institute of Egypt. But before he had accomplished much in that direction fortune delivered him a terrible blow. While he was thus occupied in the interior, Nelson, in command of the English fleet, had pursued the French fleet, found it moored in the Bay of Abukir, defeated and nearly destroyed it at the battle of the Nile, 1–2 Aug. 1798. The French were thus cut off from escape. To make matters worse the sultan declared war against Napoleon. In October the people in Cairo revolted and then occurred the fearful massacres when 2,000 people were put to death. Napoleon, however, instead of attempting to return to France resolved to conquer Syria. Early in February 1799 he started with 13,000 men to cross the desert. El-Arish, Gaza and Jaffa quickly succumbed and he then laid siege to the city of Acre which was defended by a Turkish garrison under Djezzar Pasha, assisted by the English commodore, Sir Sydney Smith. It was probably at this time that he heard of the disorders in France and the disasters to French armies. This fact combined with his inability to capture the city undoubtedly influenced his decision to return to France. He therefore on 20–21 May, after a 60-day siege, relinquished the attempt to capture the place and returned to Egypt, laying waste the country by fire and having lost over 4,000 men in the expedition. Napoleon re-entered Cairo on 14 June but not a month had passed before it was announced that a Turkish expedition of 10,000 men was marching against him. On 25 July Napoleon attacked and almost annihilated this force, which the sultan had landed at Abukir. On 22 Aug. 1799 he transferred the command of the Egyptian army to Kléber and embarking in a frigate landed at Fréjus 9 October after several narrow escapes from capture by the English Mediterranean cruisers.

While Napoleon was conducting these operations in Egypt a second coalition, in violation of the Treaty of Campo Formo, had been formed against France, embracing England, Russia, Austria and other German states, Naples, Portugal and Turkey. To meet this danger the councils passed the law of the conscription (5 Sept. 1798), and ordered a levy of 200,000 men. The campaign of 1799 was disastrous to the French. Jourdan, who had crossed the Black Forest, was defeated by the Archduke Charles at Stockbach in Swabia on 25 March, and forced to retire beyond the Rhine. Shérer, who was entrusted with the command of the army of Italy, was defeated at Magnano on 5 April. Moreau, who superseded him, sustained further reverses; and Macdonald, who came to his assistance with the army of Naples, was totally defeated in the battle of the Trebbia, 17–19 June. Turin, Alessandria and Mantua were captured. Joubert, who succeeded Moreau, was defeated and killed at Novi 15 August. On the other hand, the Anglo-Russian campaign in Holland failed; and Masséna, after a brilliant campaign in Switzerland, defeated the Russians and Austrians at Zürich on 25 September. This induced the Emperor Paul I to make peace.

Napoleon, on his return, found the government in great embarrassment. Its credit was wholly gone. It was obliged to fund the interest of its debts or pay it in worthless paper money. It was ill-obeyed by its generals. A revolution had taken place in the government (18 June), but the new directors were as incompetent as the old. In these circumstances was accomplished the revolution of the 18th and 19th Brumaire (9–10 Nov. 1799) by which the directory was abolished. The councils being alarmed by rumors of a Jacobin plot, the Ancients gave orders that both bodies of the legislature should be transferred to Saint Cloud under the conduct of Bonaparte, who was entrusted with the command of the troops. Bonaparte had already secured the co-operation of Moreau and the other generals present in Paris. On the 10th Napoleon entered the Council of the Ancients assembled at Saint Cloud, and insisted on the necessity of a new constitution. On proceeding to the Council of the Five Hundred he was received with cries of *à bas le dictateur*. General Leclerc, by his orders, entered and dispersed the assembly. The members of the two councils who were favorable to Bonaparte then appointed a provisional government of three consuls — Bonaparte, Siéyès and Roger Ducos, and a committee consisting of 25 members of each council to draw up a new constitution. This was proclaimed on 15 December, and called the "Constitution of the Year III." The three consuls were appointed for 10 years, and re-eligible. The first had all the executive powers, the others only a consultative voice. This constitution was submitted to the approbation of the people, and accepted by 3,011,107 suffrages against 1,567. The departments were put under prefects directly responsible to the Minister of the Interior. The prefects, subprefects and maires of communes had their councils, which were merely consultative, the whole executive power being in the hands of the officer responsible to government.

Bonaparte chose Cambacérès and Lebrun as second and third consuls. He then undertook the task of reforming civil affairs. He recruited the national treasury, repealed many of the more violent laws that had been promulgated during the Revolution, and reopened the churches. He wrote letters to the king of England and the emperor urging, in theatrical terms, the restoration of peace, but these overtures were refused, and his next business was to prepare for war. He gave Moreau the command of the army of the Rhine, and determined himself to proceed to Italy. Masséna with the remains of the French army was shut up in Genoa. On 13 May 1800 he began his memorable march across the Alps and on 2 June to the surprise and consternation of the allies entered Milan. After several unimportant skirmishes he attacked and decisively defeated the Austrians at Marengo on 14 June 1800. He thus for a second time secured to the French possession of all the Piedmontese fortresses. By the Convention of Alessandria, signed on the 16th, Melas abandoned all Piedmont and Lombardy to the Oglio. Napoleon then committed the command to Masséna and returned to Paris. Meanwhile Moreau defeated the Austrians in several engagements during May, and forced them to take refuge in Ulm. For a while Napoleon's time was divided between campaigning and negotiating. The English, however, finally persuaded the Austrians to continue the struggle and late in the year hostilities once more began in the valley of the upper Danube. Moreau again defeated the Austrians under the Archduke John on 3 December in the important battle of Hohenlinden; and after a series of brilliant combats drove the Austrians back till Vienna was in terror. Brune, who succeeded Masséna, extended the Italian conquests in Tuscany and Venetia. Negotiations were then entered on by Austria, and the Peace of Lunéville concluded 9 Feb. 1801. The Rhine was recognized as the boundary between France and Germany. The Adige was to be the boundary of Austria and Italy. The independence of the Batavian, Helvetian, Cisalpine and Ligurian republics was guaranteed. A treaty was also concluded with Spain at Madrid on 21 March; and by the Treaty of Florence 28 March, Naples agreed to renounce the coalition, and received French garrisons. Treaties were also signed with the Pope, Bavaria, Portugal, Russia and Turkey. Russia, Prussia, Denmark and Sweden then formed an armed neutrality in opposition to the naval privileges claimed by England, which now maintained the war single-handed. This led to a brief war between England and the northern powers except Prussia, which was terminated by the death of Paul I, and the battle of Copenhagen.

During all this time, the French army in Egypt, thought greatly weakened, was unsubdued. On 8 March 1801 an English fleet under Abercrombie debarked 18,000 troops at Abukir; on 13 March this force attacked and defeated the French. On the 17th Sir Sydney Smith reduced the forts at Abukir; and on the 20th 15,000 English again attacked 9,000 French and forced them back to Alexandria and Cairo. General Kléber had been assassinated and on 30 August General Menou, by a capitulation with the English, agreed to evacuate Egypt. Both England and France were now anxious for peace. Preliminaries were signed on 1 October and the Peace of Amiens was concluded 27 March 1802. France retained her continental conquests. Ceylon was ceded to England by Holland, and Trindad by Spain. All the other conquests of Great Britain were restored. Malta, which had been taken by the English, was to be restored to the Knights of Saint John. This lull in active warfare allowed Napoleon time to crush an insurrection of the blacks in Santo Domingo.

Napoleon exhibited his wonted vigor in home administration. By means of the Senate he silenced the opposition of the tribunate and the corps législatif. He assembled the most noted lawyers in France under the presidency of Cambacérès to draw up a new code of civil laws now known as the "Code Napoleon." (See CODE). He entered into a concordat with Cardinal Consalvi for the re-establishment of the Catholic religion. He undertook public works, constructed roads and bridges, encouraged industry and commerce. On 2 Aug. 1802, Napoleon and his colleagues were made consuls for life.

The external policy of Napoleon was not calculated to conciliate the jealousies caused by the extension of French dominion. The independence of the new republics was merely nominal. The island of Elba was occupied and incorporated with France in August 1802, Piedmont 11 September and Parma in October; while in the same year Piacenza was united to France and an armed intervention changed the government of Switzerland. Holland was also treated as a part of France and received a constitution from Paris. By the Treaty of Lunéville the German princes dispossessed by the advance of the French boundary were to be indemnified beyond the Rhine. The process of compensation was not carried out with sufficient promptitude for Napoleon. By his interference, in conjunction with that of the emperor of Russia, the indemnification was effected by the extinction of the two electorates of Cologne and Trèves, and the secularization of the ecclesiastical estates. Napoleon on 30 April 1803 sold Louisiana to the United States for $15,000,000.

The discontent excited in England by this aggressive policy made it evident that the peace could not be maintained, and the government refused to evacuate Malta. On 16 May 1803, two days before the declaration of war, an embargo was laid on all French and Dutch vessels in English harbors. Napoleon retaliated for this lawless proceeding by seizing as hostages all English travelers in France and Holland, and General Mortier took military possession of Hanover. Russia and Prussia attempted to intervene, but on terms unacceptable to France. Spain and Portugal had to purchase their neutrality from France; but as this purchased neutrality placed the former at the disposal of France, England declared war with Spain. Naples was occupied by French troops, and vast preparations were made ostensibly for the invasion of England. While these events were occurring a conspiracy for the overthrow of Bonaparte and the restoration of the Bourbons was discovered in 1804. In this the British government was implicated. The most distinguished of the conspirators were Cadoudal, Pichegru and Moreau, Cadoudal was executed, Pichegru destroyed himself in prison, Moreau was pardoned and retired to the United States.

The legislative bodies were now completely subservient to Napoleon, and the conspiracy of Cadoudal was made a pretext for offering him the title of emperor. The *senatus-consultum* for the regulation of the empire, drawn up by Napoleon himself, was passed 18 May 1804. The empire was confirmed by a popular vote of 3,572,329 against 2,569. The coronation took place at Notre Dame on 2 Dec. 1804, and the empire was established.

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GEORGE EDWIN RINES.

4. THE EMPIRE. As the fear of socialism helped to found the consulate in 1799, so the royalist plot of 1804 precipitated the foundation of the empire. Much as France abhorred the execution of the Duc d'Enghein, she was still more aghast at the prospect of the turmoils which would ensue, should Napoleon be suddenly removed from the head of affairs. "The need of repose and stability," says Miot de Melito, "was so pressing, the future so disquieting, the fear of terrorism so great, the return of the Bourbons so formidable that people quickly grabbed at any expedient which might save them from those dangers." Seven days after the Duke's murder, Fouché appealed to the Senate to establish hereditary government. The idea was taken up on every side. Carnot alone opposed it in the tribunate; the Senate, the council of state, reported on its favor and after a brief period of affected hesitation Napoleon complied with the general desire. On 18 May 1804, a constitution which had been elaborated by Fouché and Talleyrand was adopted in the Senate with three dissentent voices. It decreed to Napoleon the title of emperor of the French and settled the succession to the throne on his direct male issue, natural and legitimate. It enabled a childless emperor to adopt the children or grandchildren of his brothers, and designated Joseph and Louis Bonaparte (Napoleon's brothers) to the succession, in case the emperor should die without natural or adopted children. The civil list was fixed at 25,000,000 francs, a sum established in the constitution of 1791; and other provisions were added with the design of adding brilliance and authority to the throne. Six grand dignitaries of the empire, irresponsible, irremovable, enjoying the status and prerogatives of princes, were to support the new emperor. Cambacérès was made archchancellor, Lebrun, archtreasurer. The office of grand-elector — a title borrowed from the nomenclature of the Holy Roman Empire — was conferred on Napoleon's elder brother Joseph; the office of constable was given to the younger brother Louis. The remaining two dignities were ultimately conferred upon connections by marriage, and while Napoleon's stepson, Eugène Beauharnais, became archchancellor of state, his brother-in-law, Murat, was given the rank of high admiral. Another provision in the Senate's constitution of 18 May 1804 was designed to conciliate the army. There were to be 16 marshals of the empire, and the marshal's bâton henceforward became the chief prize of military ambition. At the same time the court was furnished with decorative officials, with a grand almoner (Cardinal Fesch), a grand marshal of the palace (Duroc), a grand chamberlain (Talleyrand), a grand equerry (Caulaincourt), a grand master of ceremonies (De Ségur), and with numerous prefects and ladies of the palace. The changes made in the mechanism of the government were even more significant of absolutist tendencies. The restriction placed upon the numbers of senators was removed and their nomination conferred upon the emperor. The tribunate was divided into three sections, dealing respectively with legislation, home affairs and finance, a measure which effectually destroyed its potency as an organ of protest; and though the legislative body was given the power of discussing measures in a general committee, the discussions, unless invited by the council, were neither to be published nor printed. As a matter of fact both tribunate and legislative ceased to be working parts of the machinery. As the powers of the tribunes expired, no fresh nominations were made, and so the body vanished from the constitution. A more expeditious method of legislation was discovered. The emperor governed by means of *Senatus Consulta* or decrees of the council of state.

The French people acclaimed the constitutional revolution by more than three and a half million votes; that is to say, by a larger majority than was given for the consulate or the consulate for life. Of the opponents, Carnot was the most conspicuous; and it is noticeable that almost all the barristers of Paris were against the establishment of monarchy; but the army was flattered by the elevation of its leader, and the peasantry saw in the change a fresh guarantee for the stability of revolutionary land settlement. That he might reassure the Catholics, and win the royalists, Napoleon summoned the Pope to preside over the coronation. Pius VII undertook the journey, but was destined to receive a lesson upon the relations of the spiritual to the temporal power. After he had anointed the emperor and empress with the holy oil and as he was proceeding to perform the act of coronation, Napoleon seized the crown and placed it on his head with his own hands. The sword and insignia of Charlemagne were brought from Aix to give significance to the occasion, as if the ceremony of Notre Dame betokened nothing less than a revival of the great Frankish empire.

Meanwhile war had broken out with England. The vigilance of the English fleet prevented that concentration of the French navy in the Channel which was essential to the escort of the Boulogne flotilla, but Napoleon had paved the way for a war with Austria, in case it should prove impossible to strike at London. On the pretext that an emperor could not also be president of a republic, it was determined to convert the Italian republic into a monarchy. The Italian crown was offered first to Joseph, then to Louis, but the brothers were too ambitious to renounce their claims on the imperial succession, and Napoleon finally decided to assume the crown himself and to appoint Eugène Beauharnais his viceroy. Italian deputies were summoned to Paris to vote the crown and in May 1805 Napoleon went to Italy to receive it. In the cathedral of Milan on 26 May he placed the old iron circle of the Lombard kings upon his brow, and though the French senate and the rulers of Europe were assured that the Italian kingdom and the French empire would be kept strictly separate, no one was deceived. The annexation of Genoa to France was a proof that Napoleon's ambition was insatiable, and advertised to the powers that war was the only remedy. By July 1805 Russia had determined to break off relations with Napoleon; on 9 August Austria gave her secret adhesion to the Russo-British alliance, by the middle of September an Austrian army under General Mack was at Ulm. The speed and genius of Napoleon disconcerted all the calculations of his enemies. The army of England (rechristened 29 August the grand army) was swung round, and rapidly pushed through Germany into the valley of the Danube. On 20 October Mack, surprised, surrounded, and overwhelmed, capitulated at Ulm; and on 2 December (the anniversary of the coronation) the Austrians and Russians were defeated with huge loss at Austerlitz. Francis withdrew from the war and on 20 Dec. 1805 signed the treaty of Pressburg with France.

The most obvious political result of the campaign was that the influence of the French empire was substituted for that of Austria in Italy and Germany. The Hapsburgs were compelled to recognize the Italian kingdom and the annexation of Genoa, and to cede Venetia, Istria, and Dalmatia to the victor. The Neapolitan Bourbons had received an Anglo-Russian force into their capital, and for this violation of neutrality they were condemned to expulsion. Accordingly no sooner had peace been struck at Pressburg than Napoleon sent Saint Cyr (q.v.) and Massena (q.v.) to expel «the guilty woman» who had so flagrantly «violated all that is sacred among men.» In this mission they were successful. On 13 Jan. 1806, Ferdinand and Caroline fled to Sicily, where they were secured by the protection of the English fleet. The kingdom of the two Sicilies was given to Joseph. Elise Bacciocchi, a sister of Napoleon, became princess of Lucca and Piombino, while another sister, the beautiful Pauline Borghese, received the principality of Guastalla. Thus the whole of the Italian peninsula, save the Papal States, came under French control.

The results of Austerlitz were no less impressive in Germany. Before the war Napoleon had solicited and obtained the alliance of the South German dynasties and after the victory he proceeded to reward his allies. Bavaria and Wurtemburg were raised to the dignity of kingdoms; Baden became a grand duchy, while marriages were arranged between Eugène and Princess Augusta of Bavaria, Jerome and Princess Caroline of Wurtemburg and Stephanie de Beauharnais and the Crown Prince of Baden. By recognizing the independent authority of the three South German princes Napoleon had practically eliminated Austrian influence from South Germany, but so long as the shadow of the Holy Roman Empire remained, the Hapsburgs still retained a right of intervention in German affairs. This right Napoleon determined to abolish. On 1 Aug. 1806, the Diet of Ratisbon was informed that the Holy Roman Empire was at an end. In place of this ancient and picturesque institution a confederation of the Rhine was formed under the protectorate of Napoleon, a «new Carolingian code» as it was called in Paris, where it was drafted under the direction of Talleyrand. The 16 princes who joined the confederation were bound by a close offensive and defensive alliance to France and compelled to furnish contingents to the grand army. As the price of their subservience to the Protector of the League, they were encouraged to be autocratic in their own dominions.

As Austerlitz gave Napoleon control of Southern Germany, so Jena and Friedland made him master of the north. The Prussian court, roused by the occupation of Hanover in 1803, the murder of the Duc d'Enghein in 1804, and the violation of Prussian neutrality by Bernadotte's corps in 1805, determined (October 1805) to present an ultimatum to Napoleon and in the event of his refusal to cast in her lot with the allies. But the battle of Austerlitz intervened, and Haugwitz, the bearer of the Prussian ultimatum, was compelled to sign the humiliating treaty of Schönbrunn (15 Dec. 1805), the main object of which was to involve Prussia in war with England by forcing her to accept Hanover. But the war spirit was now high in Berlin, and everything in Napoleon's conduct during the ensuing months — the formation of the Confederation of the Rhine, the obstacles placed in the way of a counterbalancing confederation of the North — was calculated to raise it. Finally Prussia learned that Napoleon was offering Hanover to England, and rushed into war. Napoleon, swiftly marching through the depths of Thuringia, beat the Prussians at Jena and Auerstadt, 14 Oct. 1806, occupied Berlin, compelled the Saxons to enter the confederation of the Rhine, and finally, after the bloody and indecisive battle of Eylau, 6 Feb. 1807, won a crowning victory at Friedland, 14 June, which led Alexander of Russia to decide for peace. The three sovereigns met at Tilsit, and then a peace was signed 7 July 1807. Prussia was not only compelled to pay a heavy war indemnity, and to support a French army of occupation, but was stripped both of her eastern and western provinces. The provinces (save the circle of Bialystock) acquired by the second and third partition of Poland, were formed into a grand duchy of Warsaw, which was attached to the Saxon kingdom, and consequently included in the Rhenish confederation. On the western frontier, the Westphalian province, including the important fortress of Magdeburg were, together with the Duchy of Brunswick, parts of Hanover and the electorate of Hesse-Cassel, formed into a kingdom of Westphalia for Prince Jerome, the youngest brother of the emperor, likewise included in the Rhenish confederation. The Baltic littoral passed under French control, for, though Danzig was proclaimed a free city, it was to be governed by a French force, and though the Duchies of Oldenburg and Mecklenburg-Schwerin were restored to their respective dukes, they were to sustain a French army of occupation until the general peace. Meanwhile, on 21 Nov. 1806, Napoleon had issued the famous Berlin decree (q.v.), the object of which was to ruin England by excluding her goods from the continent, and by declaring the British isles to be in a state of blockade. But to make the continental blockade completely effective it was necessary to control all the littoral of continental Europe; and this, accordingly, became the primary aim of imperial policy. The Batavian Republic was converted into a kingdom of Holland, and placed under the control of Louis in 1806, while the refusal of the Pope to accede to the blockade led to the gradual absorption of the Papal States, and to their final incorporation in the French Empire in 1809. This, too, was the primary motive for Napoleon's intervention in the affairs of the Iberian peninsula. While returning from Tilsit, Napoleon commanded Talleyrand to inform the Portuguese that unless they closed their forts to the British by 1 Sept. 1807, he would declare war upon the Prince Regent. As Portugal did not acquiesce, a secret convention was signed at Fontainebleau, 27 Oct. 1807, between France and Spain, providing for the joint conquest and partition of the Portuguese kingdom. The conquest was rapidly effected, and as Junot (q.v.) with 1,500 famished grenadiers struggled into Lisbon, 30 Nov. 1807, the Prince Regent and the royal family fled to South America. But meanwhile Napoleon was preparing to overthrow the Bourbon house in Spain. The court of Madrid had secret grudges against the French Empire, and in a moment of infatuation during the summer of 1806, the Spanish army had been mobilized, with a view of rejecting the treaty of Ildefonzo, which had been the source of the destruction of the Spanish navy. But Jena upset the calculation of Godoy, the miserable favorite, who held the reins of Spanish policy. He explained away his action, protested friendship, showed himself in the treaty of Fontainebleau, prepared to connive at the destruction of the house of Braganza, and did not for a moment deceive Napoleon. The Portuguese campaign, and the dissensions between Charles IV and his son Ferdinand, gave to Napoleon the pretext for interference. French troops were sent across the Pyrennees, nominally for the purpose of supporting the army of Portugal, really in order to effect the subjugation of the country. Finally the royal family was enticed to Bayonne, and father and son compelled, 5 May 1808, to renounce their claims to the throne. Joseph was sent to govern in Madrid, while Murat, the grand duke of Berg, took his place in Naples. By the middle of May the whole Iberian peninsula had nominally become an annex of the French Empire. In reality the gravest mistake had been committed. An English army under Sir Arthur Wellesley (q.v.) defeated Junot at Vimievo 21 Aug. 1805, and forced the French to evacuate Portugal, while the Spanish people, passionately loyal to the fallen dynasty, hating the French revolution, and impervious to the charms of a scientific administration, everywhere rose in revolt. On 22 July 1808, a large French force under Dupont (q.v.) capitulated at Baylen. It was the first serious military reverse which the French Empire had sustained.

The Austrian war of 1809 was the natural sequel to the insurrection of the Spanish people. Germany was smarting under the hardships involved by the French military occupation and the continental blockade; and the deepest resentment was caused by a decree issued by Napoleon, commanding the banishment of Stein (q.v.), the great reform minister from Prussia. Every German who hoped for better things looked to Austria as the destined liberator; but again the genius of Napoleon overcame all obstacles. Five brilliant battles (19–23 April) drove the Archduke Charles out of Bavaria. On 13 May Vienna surrendered to Napoleon. On 6 July he won the hard fought field of Wagram. The English diversion at Walcheren was as ineffective as the gallant raid of Colonel Schill or the march of the Duke of Brunswick's black legion through northern Germany. On 14 Oct. 1809, Francis of Austria accepted the treaty of Schönbrunn, and abandoned the Tyrol, Trieste and the Illyrian littoral to the conqueror. The Tyrolese, who, under the leadership of Andreas Hofer (q.v.), an innkeeper, had made a gallant resistance to the French, were now easily overcome, and while their leader was shot, to the eternal disgrace of Napoleon, their territory was divided between the kingdoms of Italy, Bavaria and the Illyrian provinces of the French Empire. Nor was this the last affront to Austrian pride. Divorcing Josephine, Napoleon demanded and obtained the hand of Marie Louise, the daughter of Francis. The French Empire had now reached its zenith, though some further rearrangements of territory were effected, mainly for the purpose of improving the mechanism of the blockade. Thus Louis, who was considered to be too lenient to the Dutch, was compelled to abdicate, and the kingdom of Holland was annexed to the Empire on 9 July 1810; while at the end of the year (December 1810) the northwestern portion of the Westphalian kingdom, and all the northwest littoral of Germany, including Bremen, Hamburg, Lübeck were similarly incorporated and organized as French departments. The rigor of the blockade now reached its height. Heavy duties were placed upon all colonial imports by the Trianon tariff, 5 Aug. 1810. The Fontainebleau decrees (18 and 25 October) ordered that all British manufactured goods found in the Napoleonic states should be seized and publicly burnt, while 51 tribunals were established for the purpose of trying persons accused of contraband. So eager was Napoleon to complete the system that in January 1811, he dethroned the Duke of Oldenburg, the uncle of the Tsar.

The French Empire by this time consisted of 130 departments, stretching from the Ebro to the Trave, and from the Tiber to the Channel, and girt with a circle of vassal kingdoms and principalities. Throughout this vast area the valuable principles of social equality, religious toleration, and promotion by merit were enforced. Though the codes of the Empire were more perfunctory, more observant of older legal traditions and less liberal than the civil code, which was the work of the consulate, yet they preserved two valuable conquests of the Revolution, the petty jury and public trial. If the essence of democracy was, as Napoleon contended, "a career open to talent," then the French Empire was democratic; but in every other respect it violated the principles of liberty. Special courts were created with summary jurisdiction in the disturbed districts. The censorship of the press (aggravated by the decree of 5 Feb. 1810) annihilated political criticism. Holding that there could be no political stability without “a teaching body actuated by fixed principles,” Napoleon created 17 March 1808, a University of France, which was intended to include all the educational agencies in the Empire, and to form citizens “attached to their religion, their prince, their country, and their family.” No one could open a school or teach in public without being a graduate of the university, which was to create and administer the public and to authorize and supervise the private schools. The university was divided into 16 academies, one in Paris and 15 in the provinces, and governed by a grand-master, whose appointment and dismissal lay in the hands of the Emperor. The aim of the whole institution was to inculcate habits of military discipline and blind subservience, and to secure complete educational uniformity throughout his empire. An imperial catechism, drawn up by Napoleon himself and inculcating obedience to his person, was intended to give a similar direction to the public mind. To fortify the dynasty, Napoleon saw that it was necessary to create an hereditary nobility, but the opposition which had been made to the Legion of Honor in the name of equality warned him to proceed with caution. In the first instance he began by distributing foreign fiefs and titles, carving no less than 17 duchies out of the Venetian states; then (August 1806) license was given to exchange grand ducal fiefs for estates within the territory of the empire, and to transfer to estates so acquired the privilege attaching to noble tenure. Finally, on 1 March 1809, a new nobility was created, the titles to be hereditary and the noble lands to be entailed. In all, 31 dukes, 388 counts, 1,090 barons and about 1,500 knights were created under the first empire; but Napoleon was uneasily conscious that aristocracies were the product of time, and that the nobility of the ancient régime deposed the upstart dignitaries of the empire. “I have made princes and dukes,” he said at Saint Helena, “but I could not make real nobles.”

In France the burden of the empire was great; but it was still more crushing in the dependencies. It was part of Napoleon's system to reserve half the domains in every vassal state to serve as endowments to generals or favorites, or to help to replenish his imperial treasury. In addition to this, the dependencies were subjected to the conscription and the blockade, compelled to support the French troops who might, from time to time, be quartered on them, and to maintain war establishments quite out of proportion to their financial resources. Thus the benefits secured by the introduction of the French legal codes were largely neutralized; and the French rule became detested all over Germany and Italy. The conscription was everywhere abhorrent, while the blockade inflicted great injury whereever, as in Holland or the Grand Duchy of Berg, commerce or industry had been active. If the Italian, Dutch and German merchandise had been permitted a free entry into the French markets the lot of the mercantile and industrial community might have been alleviated; but in this, as in other respects, Napoleon sacrificed the interests of the French dependencies to those of France herself.

The reconciliation with the Papacy, which had been one of the principal achievements of the consulate, was broken under the empire. The Papal States were annexed to France, 17 May 1809, by a decree recalling the donation of Constantine, and Rome was declared to be a free imperial town. Pius VII retaliated by excommunicating the despoilers of the Church, and the bull was secretly circulated through the empire. For this act of temerity he was seized 5–6 July 1809, and carried off to Savona, where he was kept a prisoner. Difficulties, however, soon arose. The Pope refused to institute the bishops named by Napoleon; and Napoleon failed to coerce him. The cardinals and generals of the orders were convoked to Paris, and the archives of the Roman administration were similarly transferred to the capital of the empire. By a decree of 17 Feb. 1810, the Pope was guaranteed a salary of 2,500,000 francs, given a palace in Paris, while at the same time it was ordained that all future popes should at their enthronement swear to observe the Gallican articles of 1682, which were declared common to all the churches of the empire. This bold and revolutionary measure aroused great protests. Thirteen cardinals refused to attend the emperor's marriage with Marie Louise, and were in consequence banished to provincial towns and prohibited from wearing the purple. A national council (17 June to 5 July 1819) gave Napoleon no satisfaction, but at last a mutilated remnant of the assembly was induced to declare that the right of institution to vacant sees lapsed to the metropolitan in case the Pope failed to grant institution within six months after the see fell vacant. The Pope signed a brief accepting this conclusion, but in a form which was distasteful to Napoleon, and the sore remained open. At last, after the Russian disaster, Napoleon was induced (concordat of Fontainebleau 25 Jan. 1813) to renounce his claim to the Catholicity of the Gallican articles, while the Pope on his side confirmed the conciliar decree on the institution of bishoprics. But good feeling was never restored, and the alienation of the Catholic Church was one of the greatest errors of the Napoleonic Empire.

The downfall of the empire was the natural result of Napoleon's ambition. The Peninsula War drained France of her finest troops, relieved the pressure on Prussia and prevented Napoleon from carrying out the designs on the Balkan peninsula, which had been part of the secret arrangement at Tilsit. Other causes contributed to weaken the Franco-Russian alliance, — Napoleon's encouragement of the Poles, the continent blockade, the Austrian marriage, the annexation of Oldenburg. War broke out in 1812, and Napoleon led a huge army to Moscow. He retreated among the rigors of a Russian autumn (October-December), lost a quarter of a million men, and shattered his prestige. First Russia, then Austria, ranged themselves on the side of the allies. A crushing defeat at Leipzig (16–19 October 1813) compelled the evacuation of Germany, and brought about an invasion of France. Though Napoleon fought a brilliant campaign in the valleys of the Marne and the Seine against the

Prussian and Austrian armies, the allies eventually pressed on to Paris. On 30 March 1814, the defense of the capital was surrendered by Marmont, and on 6 April Napoleon signed an act of abdication at Fontainebleau, and was allowed to retire to Elba. His dynasty was prescribed. On the advice of Talleyrand, Alexander of Russia, who had entered Paris at the head of the allied armies, resolved to recall the Bourbons. So perished the empire in a blaze of military glory, which France will never forget.

On his return from Elba in 1815, Napoleon, realizing the growth of liberalism, made a pretense of liberalizing the imperial institutions, and Benjamin Constant, who had led the opposition to Louis XVIII, was summoned to draw up a constitution. The defeat of Waterloo supervened before any serious trial had been made of the Additional Act, which established an hereditary Chamber of Peers, an elected chamber of representatives, and at the same time guaranteed the freedom of the press; but it cannot be doubted that had Napoleon succeeded in re-establishing his powers, he would have made short work of liberals and of liberalism. At Saint Helena, however, he professed that the despotism of the empire had been a transitional expedient, and that the future of liberalism and nationality in Europe were bound up with the fortunes of his house; and this was the creed of the Bonapartist party, and the pretext and apology for the second empire.

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5. FRENCH HISTORY SINCE 1815.

With the year 1815 (fall of Napoleon, Restoration of the Old Monarchy), opens a new era in the history of France. It may be said that from that date up to 1870 all important events, in spite of their inevitable reaction, led gradually to the final destruction of the monarchy, the establishment of the republic upon a solid basis and the triumph of democratic principles. Before proceeding further, and for the sake of easy reference, it may be convenient to mention the heads of the state in their order of succession:

Louis XVIII, King, 1815–24.
Charles X, King, 1824–30.
Louis Philippe, King, 1830–48.
Louis Napoléon Bonaparte, President of the Republic, 1848–52.
Napoléon III, Emperor, 1852–70.
General Trochu, President of the Gouvernement de la Défense Nationale, 1870–71.
Adolphe Thiers, President of the Republic, 1871–73.
Maréchal de Mac-Mahon, President of the Republic, 1873–79.
Jules Grévy, President of the Republic, 1879–87.
Sadi-Carnot, President of the Republic, 1887–94.
Casimir Périer, President of the Republic, 1894–95.
Félix Faure, President of the Republic, 1895–99.
Emile Loubet, President of the Republic, 1899–06.
Armand Fallières, President of the Republic, 1906–13.
Raymond Poincaré, President of the Republic, 1913–

Louis XVIII, brother of Louis XVI, was a liberal king, not by temperament but by cautiousness, and not only tried to preserve peace which was earnestly desired by the French people, but to act according to the spirit of the charter of 1814 which gave almost entire ratification to the chief reforms achieved by the revolution: equality of rights, political liberties, a Parliament elected by the nation. Unfortunately the king's own brother, Comte d'Artois, at the head of a powerful party known as «Ultra-Royalists,» checked in some measure that liberal policy. He wanted to restore the former régime of absolute monarchy and used to say that, for himself, he would rather be a simple joiner than be a king in the same capacity as a king of England. The Ultra-Royalists were responsible for what is known as «la Terreur Blanche» (the White Terror),— in opposition to the «Red Terror» of the Convention,— that is to say for the plunders and murders of the Bonapartists and Republicans (especially in the south of France), by their supporters who were more or less encouraged by the local authorities.

It is true, nevertheless, to say that under the reign of Louis XVIII, were adopted, for the first time in the history of France, those measures which are the necessary adjuncts of a constitutional and representative government: periodical election, annual vote of the budget, liberty of discussion in the chamber, and liberty of the press. In order to be an elector it was necessary to pay taxes to the amount of 500 francs, and only those who paid taxes to the amount of 1,000 francs had the right to be elected. It must be remembered that the wealth in France is distributed into many hands, and especially at that time the men who paid 500 or 1,000 francs in taxes were relatively very rich; only a minority of the French people was represented in the Chambers.

Nevertheless, the liberal aspirations of the nation were encouraged because it was the beginning of a really liberal government. But it was only a beginning and the Ultra-Royalists who wanted to restore all the former privileges of the old aristocracy succeeded in stopping it,—but of course only for a time as nothing can stop the progress of true liberalism, once the movement is started.

The «Ultras» were in fact strongly supported by the aristocratic governments of Europe: Prussia, Austria and Russia, that had pledged themselves to stifle all revolutionary movements and manifestations in any country. For that purpose, these nations who had formed the Holy Alliance (q.v.), had proclaimed that they had a right of intervention wherever and whenever the public institutions were threatened by a revolt of the people. In fact the Holy Alliance was growing anxious at the manifestations of liberalism in France, and at the Congress of Aix-la-Chapelle (1819), they took occasion to impress strongly upon the French ambassador that if the French wanted to take care of themselves they should accept the program of the «Ultras.» At about the same time (1820), the Duc de Berri, nephew of the king, was murdered by a lunatic named Louvel. The Liberals were held responsible for this murder on the ground that their moderation weakened the power and encouraged the criminals, and the Ultra-Royalists, supported by the Holy Alliance abroad, again came into power, which they retained till the revolution of 1830, under the direction of the Comte de Villèle (1820–27) and the Prince de Polignac (1829–30). These two ministers wanted to re-establish the prerogatives of the ancient nobility, that is of the great landlords and the authority of the Church.

That policy was embodied in the following legislative measures: (1) the Emigrés (the members of the nobility who had left France during the revolution) were to receive a billion francs (indemnité du Milliard) as a compensation for the sale of their estates which had been sold for the benefit of the state. (2) Certain crimes of a religious character (the stealing of sacred church vessels), were to be punished by death. (3) Abroad, supported by the policy of the Holy Alliance, France undertook the Spanish expedition in order to overcome the revolt of the Spaniards against the absolutism and despotism of their king and to restore the latter to his full power.

In spite of the conquest of Algiers (1830) the Ultras who had not yet realized that their policy was contrary to the new French spirit sealed their doom when, in July 1830, they allowed Charles X (who had succeeded his brother in 1824) to sign the famous Ordonnances de Juillet as follows: (1) Dissolution of the Chamber of Deputies, newly elected, because it had liberal aspirations. (2) Suppression of the liberty of the press. (3) Alteration of the electoral laws in favor of the rich citizens. (4) New election to take place in the following September.

It was really a *coup d'etat*, a violation of the constitutional charter, which was immediately answered by a revolution in Paris. After three days' fighting, Charles X, an obstinate unintelligent king who had not understood in the least the spirit of the French people, had to leave not only his throne but his country, and seek refuge in England.

This short revolution did not end in the establishment of the republic, but it strengthened forever the sovereignty of the nation through a constitutional government. Another dynasty, that of the Orléans, who were cousins of the former king, was called to the throne, and Louis Philippe, when ascending the throne, was made to pledge himself to respect the new amended constitutional charter.

He was not the king *of France*, as the former kings were, but the king *of the French*, which meant that he had been freely elected by the French people, and that there was no divine right attached to the throne. Louis Philippe was a kind of liberal Bourgeois; he leaned entirely upon the middle-classes, thereby alienating both the aristocratic party and the lower classes. As regards the foreign policy under his reign, he made an alliance with England, to ensure peace on a durable basis; the Entente Cordiale dates from Louis Philippe; his Prime Minister Guizot, the famous French historian, being the main supporter of that policy. As regards the manufacturing industries the reign of Louis Philippe was marked by an unprecedented development which created or rather expanded immensely the prolétariat and the power of the poorer classes.

In fact, the latter started that Socialistic movement which was extraordinarily intensified during the third republic and whose loud and sometimes brutal protests ended suddenly,—only for a time,—on the very eve of the great European War, when Jaurès was murdered by a lunatic. The socialistic theories, preached mostly by Saint-Simon, Fourier, Proudhon and Louis Blanc, were however strongly opposed by the Guizot cabinet. Once more the republicans, allied to the socialists, brought about a revolution in Paris and dethroned the king who—history repeats itself—had to seek refuge in England (1848).

A republican government was established for the second time in the history of France. It was, however, a government of short duration, and before a really democratic government, i.e., the third and present Republic, was established, France was to suffer such a catastrophe and to be taught such a lesson as are likely never to be forgotten.

A nephew of Napoleon, Prince Louis Napoleon, was elected President of the Republic: This choice may appear to be preposterous; the reason was that there was a reactionary movement of the Monarchists and of the Bonapartists against the Republicans themselves.

The fear of a fresh revolution was directed against the republican government (which for a few weeks was only a Gouvernement Provisoire, consisting of the famous French poet Lamartine, and Garnier-Pages, Arago, Ledru-Rollin). The Socialists and the working classes were very exacting. Many riots broke out in Paris. Monarchists and Bonapartists hoping that Louis Napoleon might serve their own purposes elected him President of the republic for a period which according to the new constitution was to last four years.

Louis Napoleon, however, served only his own purpose. As he had not the right to be elected at the expiration of four years, he asked the Legislative Assembly to change the constitution so that he might be re-elected. The Assembly, however, did not accept this amendment, and that is the reason why it was dissolved by the *coup d'etat* of 2 Dec. 1851; about 100 deputies were exiled, a new constitution was drawn up admitting universal suffrage, and Louis Napoleon, appealing through a plebiscite to the people, succeeded in having himself proclaimed emperor of the French people under the name of Napoleon III. He reigned until 1870.

From 1852 to 1860 the second empire was a highly despotic government, strict censorship, drastic control of the elections by the government, no right of initiative, of amendment, of interpellation for the Chamber, no public sittings and no reports of the latter, etc. From 1860 to the end, the empire was, on the contrary, very liberal.

Napoleon III was obliged to alter his policy on account of the growing opposition of his people as a consequence of the Crimean War (1855), of the Italian War (against the Austrians 1859), who held a portion of Italy. The Catholics especially were strongly opposed to the emperor in consequence of his policy toward the Pope, when he allowed the Italian king, Vittorio Emmanuele, to seize the Pontifical States, thereby suppressing the temporal power of the Pope. Napoleon had to form a new majority from the ranks of the Liberals; the press was freed from former restraints, the elections were no longer controlled, meetings were allowed unconditionally. Nevertheless the emperor was steadily becoming unpopular; the «Roman Question» became so entangled that all parties were dissatisfied; the Mexican War had a lamentable conclusion; toward Prussia, who was growing aggressive, Napoleon did not adopt any definite policy; weakness of character, indecision of mind were not what might have been expected from a Napoleon; the very name of the great conqueror had acted upon the public mind as a sort of magic; but presently, for the second time within less than a century, the name of Napoleon was to be identified with a national catastrophe.

It is only fair, however, to say that in spite of many political blunders in his foreign policy, the districts of Nice and Savoie were given to France by Italy in exchange for the help of the French armies in the war against the Austrians which resulted finally in the unification of Italy.

This is no place to relate in details the sad tale of the Franco-Prussian War in 1870–71; the world knows that France was defeated, that Alsace-Lorraine was wrested from the mother country and that an indemnity of five milliards francs had to be paid to Prussia.

After the capitulation of Sedan (2 Sept. 1870), the Corps législatif assembled in Paris, deposed the emperor, and Republic was proclaimed by Gambetta, Jules Favre and Jules Ferry (4 Sept. 1870). A Gouvernement Provisoire was established until the end of the war. Gambetta was the most prominent member of that government; he did wonders in organizing the Défense Nationale, raised new armies and wanted, in the teeth of insuperable difficulties, to continue the war.

After the capitulation of Paris (28 Jan. 1871), however, there was no hope left — the preliminaries of peace were signed, but they were to be ratified by the French people through their representatives. An Assembly (L'Assemblée Nationale), was elected in most exceptional circumstances; the republican candidates who had Gambetta at their head wanted the continuation of the war, whilst the large majority of the nation was in favor of peace. The electors voted for the royalist candidates, and the majority in the Assembly was composed of 375 Monarchists out of 700 members. The treaty of Francfort was signed with Prussia (10 May 1871); the Commune de Paris (insurrection of the Parisians against the new government) was finally repressed and the way was cleared for a comparatively long period of peace, prosperity, democratic reforms and consolidations, the solidification of public and personal rights so much desired by the French people.

The Assemblée Nationale was composed of a majority of Monarchists, but they were divided into two parties, the Légitimists and the Orleanists.

The former supported the Comte de Chambord, a nephew of Charles X, that is to say of the Bourbons; the latter supported the Comte de Paris, a descendant of Louis-Philippe who belonged to the dynasty of the d'Orléans. Each of these two parties wanted the restoration to the throne of their respective candidates. In the meantime, Adolphe Thiers was entrusted with the executive power and received officially the title of President of the Republic (General Trochu had been the President of the Government de la Défense Nationale). The Monarchists however did not feel bound to accept the Republic as the definite form of the French government: Legitimists and Orleanists hoped that they might sooner or later come to an arrangement between themselves, but Thiers refused to be a party to any restoration. Before the hostility of the Chamber, he had to resign his office and Marshal de MacMahon was elected in his place (1873). On the other hand the Comte de Chambord made himself very unpopular by insisting that the national emblem should be the white flag (symbol of absolute monarchy); not only was he unpopular with the Republicans, which was a matter of course, but with all Monarchists as well, Orleanists and Bonapartists. The republican party was gaining ground every day; in 1875 the constitutional laws of the present Republic were voted by the National Assembly, which broke up and was replaced by two constitutional Chambers: the Chamber of Deputies and the Senate.

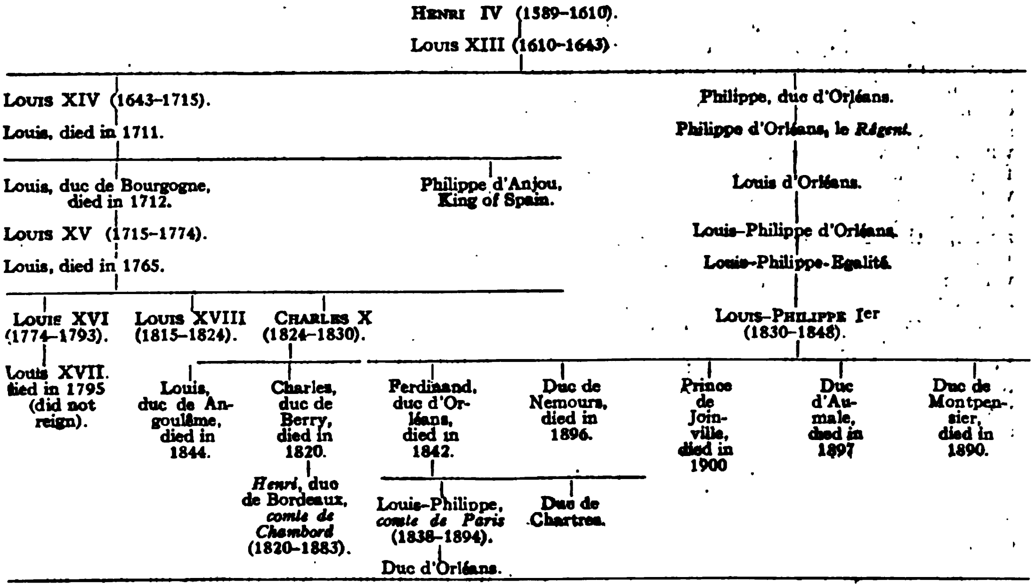
The government of the country was henceforth to be that of a parliamentary Republic based on universal suffrage. The victory of the Republicans however was not complete. A *coup d'etat* was soon to be attempted: fortunately it failed in its results.

MacMahon, as well as the Senate, belonged to the Conservative party. On 16 May 1876 the President, with the sanction of the Senate, dissolved the Chamber of Deputies. This was really a *coup d'etat*, as there was no proper reason for a dissolution except that the republican minority was becoming more and more powerful.

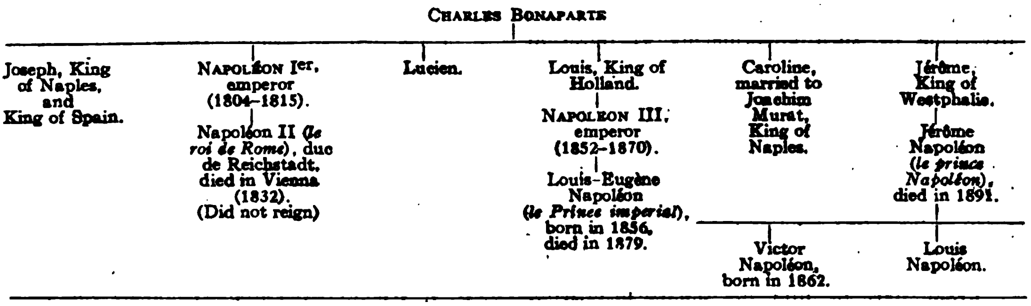
MacMahon and the Senate were, however, frustrated in their designs: the elections sent to the Chamber a greater number of Republicans whose policy was to apply in a strict manner the Constitutional Laws of 1875. Before the opposition of the new Chamber, MacMahon had to retire from the Presidency and was succeeded by a politician belonging to a modest family, a cautious, clever lawyer who had no intention to resign his post in favor of any king or emperor, being only too glad to keep it for himself. Jules Grevy was President of the Republic from 1879 to 1887.

No serious attempt was made from that time to disturb the internal peace of the country and France could after many revolutions and changes of governments devote herself to the development of her trade, her industries and her democratic institutions. All political liberties as regards press, meetings, associations, universal suffrage, etc., have been absolutely confirmed.

GENEALOGICAL TREE OF THE BOURBONS FAMILY


Henri IV (1589–1610).
Louis XIII (1610–1643).
Louis XIV (1643–1715).
Louis, died in 1711.
Philippe, duc d'Orléans.
Philippe d'Orléans, le Régent.
Louis, duc de Bourgogne, died in 1712.
Philippe d'Anjou, King of Spain.
Louis d'Orléans.
Louis XV (1715–1774).
Louis-Philippe d'Orléans.
Louis, died in 1765.
Louis-Philippe-Egalité.
Louis XVI (1774–1793).
Louis XVIII (1815–1824).
Charles X (1824–1830).
Louis-Philippe Ier (1830–1848).
Louis XVII, died in 1795 (did not reign).
Louis, duc de Angoulême, died in 1844.
Charles, duc de Berry, died in 1820.
Ferdinand, duc d'Orléans, died in 1842.
Duc de Nemours, died in 1896.
Prince de Joinville, died in 1900
Duc d'Aumale, died in 1897
Duc de Montpensier, died in 1890.
Henri, duc de Bordeaux, comte de Chambord (1820–1883).
Louis-Philippe, comte de Paris (1838–1894).
Duc de Chartres.
Duc d'Orléans.

GENEALOGICAL TABLE OF THE IMPERIAL FAMILY


Charles Bonaparte
Joseph, King of Naples, and King of Spain.
Napoléon Ier, emperor (1804–1815).
Lucien.
Louis, King of Holland.
Caroline, married to Joachim Murat, King of Naples.
Jérôme, King of Westphalie.
Napoléon II (le roi de Rome), duc de Reichstadt, died in Vienna (1832). (Did not reign)
Napoleon III, emperor (1852–1870).
Jérôme Napoléon (le prince Napoléon), died in 1891.
Louis-Eugène Napoléon (le Prince impérial), born in 1856, died in 1879.
Victor Napoléon, born in 1862.
Louis Napoléon.

As regards the Church, the Republic has very much reduced its power, by disestablishing it and confiscating all the private estates which belonged to it. (See articles on CHURCH AND STATE). Social legislation has been passed which authorizes strikes, trade-unions, regulates the work of women and children in the factories, limits the working hours, obliges the employers to insure their staff against accidents, etc.

The two internal incidents of real importance and the results of which might have been disastrous had they not been checked in time, were the agitation of the *Boulangisme* and the Dreyfus affair.

General Boulanger was very popular in the army and among the French people as a whole. Monarchists, Bonapartists and a fraction of the Republican party persuaded him to take advantage of his popularity in order to overthrow the Republic and to restore something like the Empire or the Monarchy under the name of a «Plebiscitary Republic.» At that time (1887–89) the plurinominal ballot made it possible for the candidates to stand in all the voting districts at one and the same time. For General Boulanger, who was extremely popular throughout France, this amounted to trying a plebiscite. The general had an immense success, but he belonged to a class of romantic visionaries who lack the qualities essential for any man of action: energy and quick decision of mind. The national hero did not take the tide at its flood; he hesitated and lost his venture. On the other hand the government checked the movement by restoring the Uninominal ballot, by which no candidate could stand for more than one constituency at a time, thereby frustrating all further attempts to a plebiscite; finally the leaders of the Boulangisme were tried for high treason before the Senate. Boulanger himself died in exile at Brussels where he shot himself through the head.

The Dreyfus affair had very important political consequences. Alfred Dreyfus was an artillery officer accused and convicted of high treason. He was sentenced to perpetual transportation by a military tribunal. A new trial reduced the punishment to 10 years. Finally the Cour de Cassation released him entirely. The question whether Dreyfus was or was not guilty was most passionately discussed in the press, in public and private meetings; and it is literally true to say that for a certain period of time there was no possible gathering of three or four people without a passionate discussion on the «affaire.» By degrees however the personality of Dreyfus disappeared and the point whether he was or was not guilty was totally forgotten as soon as the contending parties were able to divide themselves into two opposite groups: the Nationalists — recruited from among the Monarchists, the Anti-Semites (Dreyfus was a Jew), and some Republicans, very moderate, called the Progressives, relying for their support on the conservative and reactionary forces of the nation: army, capital, religion. On the other side, the Radicals, Socialists and Republicans of more aggressive temper united into a multifarious party, which was called the *bloc*, in opposition to the conservative forces, and claiming to fight for individual right and justice. The political life of the country was greatly intensified.

Political leagues «Les Dröits de l'Homme,» «La Patrie Française,» were created as a consequence of the internal struggle which had been raging throughout France, and which to a certain extent had drawn the attention of the whole world. The reactionary spirit of the Nationalists (a term which has been discredited by the party itself) was finally checked and overcome by such governments as those of Waldeck-Rousseau, Combes, Rouvier, Sarrien, Clémenceau and Briand. Since the Dreyfus affair the policy of France has aimed to secure a complete separation of Church and State. One of the precepts of the French Republic has been that the teaching in public schools should be neutral: the teaching must be objective, the facts must speak for themselves, especially when the Church and religious questions are involved. See articles on CHURCH AND STATE in this series.

From 1905 to 1914 the whole history of France was dominated by the desire to maintain peace which was first seriously threatened by the Emperor of Germany at Tangiers in 1905, provoking at the same time France and Great Britain. At the Algeciras Conference, the Moroccan question was apparently settled, but in 1907, 1909, 1911 Germany reopened it in spite of all previous concessions made by France and of further agreements signed by both parties after the Algeciras Conference. In 1911 when the German Kaiser sent a battleship before Agadir war with Germany was once more avoided by the conciliatory spirit of France which Germany mistook for weakness.

From that time up to 1914 Germany intensified her war preparations in the most extraordinary manner. The French army had therefore to be increased in order to be ready to face the German menace and under the government of Louis Barthou the three-year military service law was passed. According to that law every French citizen was to remain in training with the colors for three years. The law had been in existence a few weeks only when war broke out in August 1914. For the history of the Great War which terminated so gloriously for France and the Allied Nations in 1918 see WAR, EUROPEAN.

MARC DE VALETTE,

Chef d'Études Economiques de la Banque de France.

6. THE FRENCH GOVERNMENT. I. Constitutional Laws.— Strictly speaking, the political régime of France cannot be defined as a constitution but as three separate laws, called constitutional or organic, voted in 1875 and amended by two other laws, one in 1879 and the other in 1884. Strange as it may seem, these laws which make up the political mechanism of the third republic were prepared and accepted by an assembly in which monarchists constituted the majority. In fact, of the 750 members composing the National Assembly elected by universal suffrage in February 1871, about 420 were monarchists, the peasants having voted for the monarchists who favored peace rather than for the republicans who wanted war. However, in spite of their majority, the monarchists were powerless to restore royalty in France, and that for two reasons: (1) the views held by French citizens were so manifestly hostile that M. Thiers, minister to King Louis-Philippe and a strong Orleanist, chosen as «chief of the executive power» and provisional president of the new government by the monarchists, who counted on using him to bring about a restoration, openly declared himself for the Republic, thereby causing his downfall in 1875, when he was replaced by Marshal MacMahon; (2) the monarchists were divided into two rival factions, each of which supported a different candidate for the throne, the *Legitimists* being the partisans of the Count of Chambord, a descendant of King Charles X, dethroned in 1830, and the Orleanists, adherents of the Count of Paris, a descendant of King Louis-Philippe, dethroned in 1848. At one time harmony or fusion, as it was then called, seemed about to be realized between the two parties, as the Count of Paris had acknowledged the anterior and superior claims of the Count of Chambord, who, on his side, had legitimatized the dynasty of Orleans by accepting as successor the Count of Paris. But the Count of Chambord forfeited everything by obstinately rejecting the tricolored flag, symbol of the new revolutionary France, and favoring the white flag, symbol of the France of the old régime and of the divinely authorized monarchy. Therefore, Orleanists and Legitimists resumed their former positions and resigned themselves to a parliamentary republic which put them temporarily on terms of agreement by eliminating the two rival claimants. According to an amendment to the law on the organization of executive power, known as the Wallon amendment it was decided in the name of the new government, to confer upon the chief of the executive power the title of President of the Republic, and in memory of this amendment, M. Wallon was jocosely called «Father of the Constitution.»

These circumstances explain the absence of a declaration of rights and a co-ordinated constitution, such as exists in the United States of America and existed in France from the constitution of '91 to that of 1848.

The following are the three constitutional laws:

1. *The Law of* 24 *Feb.* 1875, relating to the organization of the Senate. It regulates the number of senators, the conditions of eligibility, the mode of election and renewal and the power of the assembly.
2. *The Law of* 25 *Feb.* 1875, concerning the *organization of public power.* It defines the exercise of legislative power, the mode of dissolving the Chamber, the ministerial responsibility, the method of amendment, and fixes the seat of government and of the Chamber of Versailles.
3. *The Law of* 16 *July* 1875, treating of the *relations of public power.* It deals with the meetings of the Chambers, their prerogatives and the connection of the executive power with the Chambers.

The laws of amendment are as follows:

1. *The Law of June* 1879, suppressing the constitutional residence at Versailles and transferring it to Paris.
2. *The Law of* 14 *Aug.* 1884, excluding from the presidency members of ancient dynasties and forbidding the republican form of government to be called into question and suppressing irremovable senators and public prayers.

Of these five constitutional laws one has now almost completely disappeared, that is the law concerning the Senate. Of the four others, exclusively relative to political organization, only the following facts are constitutionally established:

1. The existence of a *legislative power* divided into two assemblies, the Senate and the Chamber of Deputies, concerning the organization of which the Constitution mentions only the functions, the interior organization, the privileges of members and the election of deputies by universal suffrage.
2. The existence of a *President of the Republic,* the complete enumeration of his functions and prerogatives and directions in regard to the mode of election and the duration of power.
3. The *reciprocal powers* of the President and the Chambers either in regard to each other or to common questions, such as the convocation of the Chambers, length of sessions, form of dissolution, general procedure of amendments, forms of presidential and ministerial responsibility, method of promulgating laws and concluding international conventions.

Everything outside of these matters depends upon legislative action; the electoral system, ministerial organization, communal, departmental, judiciary, military and financial administration, etc. However one question remaining outside of both constitution and legislation is the form of government. Contrary to preceding constitutions, these constitutional laws give the greatest scope to legislative action and tend to confound the legislative and constitutional authority.

II. The Principle of the Separation of Powers.— (*a*) *Formation and evolution of that principle before the Third Republic.*

Under the *Ancien Régime,* the king, by the use of his sovereignty and the abuse of extreme penalties, absorbed in his own hands an absolute power. The right of making regulations and by-laws on all sorts of matters was exercised by the king's agents, that is to say by the «intendants» (Provincial Governors), the Provincial Assemblies and the Provincial States. In fact, such agents were entirely dependent on their master's omnipotence, and the legislative power could play only an auxiliary part. Such principles were thoroughly upset by the Great Revolution of 1789. The representative system was finally adopted in spite of inevitable reactions with the results that the French Parliament has now a predominant influence and the separation of powers is as nearly complete as it may be. The initial conception of the National Assembly was expressed in the following manner: «The legislative Power alone, has the right of interpreting or completing the laws which have been passed. To entrust such a dual function to the executive power would create a confusion of two Powers which public interest requires to be distinct.»

The Assembly, however, objected to such wording, the character of which appeared too absolute, and adopted the following resolution, which became article 6, title III, chapter IV, section 1 of the Constitution of 1791: «The executive power cannot make any law, even of temporary character; it can only make proclamations whch are consistent with the laws, for the purpose of ordering their execution or calling attention to their observance.» From that moment, the right to make regulations and by-laws concerning all the matters, was entrusted by the Constitution to the exclusive care of the Assembly, and was withdrawn from the king. Such was also the case for all matters upon which the Assembly itself had passed a law. The Legislative Assembly which succeeded the *Assemblée Constituante,* adopted the same principle when it defined the attributes of the executive power. The same tradition was also followed by the Convention, the *Constitution Jacobine* and the *Constitution Girondine* of 1793. The latter conferred to the *Conseil Exécutif* a power which was limited to the execution of the laws and decrees of the *Corps Législatif* (article 65). All matters which could be dealt only by laws were enumerated in articles 54 and 55. The Constitution of the year III (1795) made the attributes of the executive power more extensive by suppressing the list of matters which were considered as being of an exclusive legislative character. The laws became less elaborate in their details, allowing the executive power, i.e., the *Directoire,* not only to enforce them, but to provide regulations intended to complete them. The *Directoire* did not even limit its activities to such regulations as were required by the laws, it took the initiative of providing many others which were not connected with any existing law and which concerned chiefly the police, the theatres, the exchanges, or military or naval matters.

The executive power was made much stronger than the legislative by the Constitution of the year VIII (1800). In the latter there is no mention of the principle of the separation of powers; there is no definition of the law; the government proposed the laws the wording of which was prepared by the *Conseil d'Etat* and the executive power was entrusted with the care of providing practical regulations, especially in the form of *règlements d'administration publique*. Under the First Empire, Napoleon took completely in his own hands the legislative and the executive powers. A great number of his decrees encroached upon the field proper to the legislative power, especially after the Senatus of the *28th Floréal An XII*, which is considered as the first law decree.

The Charter of 1814 conferred upon the king the right of making regulations and orders concerning the execution of the laws and the safety of the state (article 14). It was only under the Restoration that the principle of the separation of powers was reasserted, under that régime the parliamentary and constitutional practices were made more definite than ever before. The executive power developed more and more its attributes by making such regulations as were sometimes more or less required by the laws, and sometimes were not required at all.

The Charter of 1830 (article 13) curtailed the prerogatives of the sovereign by providing that «the king can no longer suspend the effects of the laws themselves nor their enforcement.» But the practice which had been established since the Charter of 1814 continued nevertheless to be followed. The form to be assumed in the regulations of public administration was determined by order of 18 Sept. 1839, article 6, which requires a discussion of the matter first in committee, then in a general assembly of the Council of State. The advice of the Council of State, in the regulations of public administration, was made legally necessary by a law passed on 19 July 1845. The Provisional Government of 1848 kept in its own hands all the attributes of full sovereignty; its regulations are consequently considered as law-decrees.

The Separation of Powers was proclaimed once more by the Constitution of 1848. The President of the Republic was only to supervise and to procure the execution of the laws, but no mention was made that he had the right of drawing up regulations. However the practice established by the *Directoire* and adopted by the kings since the Charter of 1815, quickly reasserted itself and the President took the initiative of drawing up regulations.

The *coup d'etat* of 2 Dec. 1851 once more modified the conditions under which the Separation of Powers used to be made effective. Up to 25 March 1852 the President disposed of the legislative and executive powers. During his reign, Napoleon III adopted the same system as Napoleon I, without however encroaching so radically upon the legislative power.

After the revolution of 4 Sept. 1870, the two powers were once more concentrated in the hands of the government of National Defense which wielded absolute power until 12 Feb. 1871.

(*b*) *Separation of the Powers under the Third Republic.*— The first law which organized the public powers was passed by the National Assembly on 17 Feb. 1871. Monsieur Thiers was made head of the executive power which he was to exercise under the supervision of the Assembly. Another law of 31 Aug. 1871, (Constitution Rivet), gave to M. Thiers the title of President of the Republic. A third law of 13 March 1873, (Provisional Constitution) took away from the President of the Republic the right of addressing himself to the Assembly; it also modified the prerogatives of the President which allowed him to suspend the official publication of the laws for a certain period. A law passed 20 Nov. 1873, (Loi du Septennat), decided that MacMahon who had succeeded M. Thiers in May 1873 should hold the presidency for a term of seven years. It was only in January 1875 that the constitutional laws began to be discussed. The powers of the President of the Republic were defined by article 3 of the law of 25 Feb. 1875, in the following terms: «He (the President) has the initiative of the laws together with the members of the two Chambers; he supervises and secures their execution.» Although no mention was made of the continuation or the abrogation of the practice which had been followed since the Constitution of the Year VIII (1800) concerning the executive power, the framers of the new Constitution have always held that the fundamental rule to be applied was the principle formulated by Montesquieu on the separation of the three powers: (1) Establishing the laws; (2) Enforcing them; (3) Deciding on offenses or individual conflicts.

The Constitution of 1875 must be considered as being rather similar to that of the year VIII (1800) as regards the separation of powers; the legislative power is completely and exclusively entrusted to the state, but there is no doubt that the President and his ministers have the right to make by-laws and regulations under the form of regulations of public administration, and decrees in Council of State or ministerial decrees.

The tendency of the legislative power is more and more to leave it to the executive power to devise the means of enforcing in a practical way the laws which have been passed. That delegation of power is the more necessary because in many instances the enforcing of the laws is conditional upon the previous establishment of practical and detailed regulations or decrees which under the form of «*Règlement l'administration Publique*» always require the advice, that is to say the sanction, of the Council of State in general session, and have the same character as the law itself. The other decrees (which do not assume the form of «*Règlement l'administration Publique*») may be rendered without a special delegation of the legislative power. The point is to know whether such decrees, rendered on the initiative of the Ministers of State, may or may not refer to such matters as have already been dealt with by legislation. As regards the constitutional laws, the negative is absolute. As regards the other laws, the tradition admits the eventual interference of the executive power, but in a very limited way, mostly in matters of a purely administrative character, rarely in civil or commercial legislation, and in that case merely for the purpose of settling points of detail in the light of the fundamental principles, In fact, the growing activities of the legislative power form the best regulating factor of the separation of powers.

III. **The Legislative Power.**— The two powers established by the constitutional laws have been accurately stated and defined by a combination of laws forming the real constitution.

1. *The Election of Representatives.* (*a*) *The Chamber of Deputies.*— The application of universal suffrage was regulated by the laws of 20 Nov. 1875 and 13 Feb. 1889, both of which bear upon a great many points in the laws of 31 May 1850, and of 2 Feb. 1852. *Electors.*—Any citizen over 21 years of age enjoying civil and political rights, domiciled for six months in a district and enrolled on the electoral lists, is entitled to vote, which right is, however, withheld from all military men actively engaged either on land or sea. *Eligibility.*— Any citizen fulfilling the aforesaid conditions is eligible except in the cases prohibited by law, i.e., where one is a member of an old dynasty or holds a government office within his own province. Moreover, numerous incompatibilities prevent the cumulation of a public office and a legislative mandate. Exceptions are made in favor of ministers, prefects of the Seine and of police, chief magistrates of the high courts of Paris and professors of the University. All candidates must declare their candidacy at least five days before the voting so as to prevent one individual presenting himself as a candidate in more than one constituency, such plural candidates being forbidden by the law of 1889. The voting is by ballot, one deputy being named for each arrondissement; however, when an arrondissement has more than 100,000 inhabitants, it is divided into electoral districts. The law of 27 March 1914, has made some changes in the composition of the electoral districts so that the number of deputies for the whole of France and her colonies is now 602. (The vote is by secret ballot on a white paper —"bulletin"— folded and deposited in the ballot-box by the chairman of the voting bureau, who is always a municipal magistrate, assisted by four assessors, appointed by the electors at the opening of the poll; the hours of voting are from eight o'clock in the morning to six in the evening. A rough count by a committee of the electors themselves follows immediately on the close of the poll, before the official recount. This rough count consists in the exercise of the right of such a committee to open all the voting papers). The law prescribes two ballots at an interval of 15 days; to be elected on the first ballot, a candidate must have an absolute majority (half the votes plus one); on the second ballot, called *ballotage*, and brought into play only if the first ballot is inconclusive, a majority of votes cast suffices. Deputies are elected for four years, the full number of the chambers being elected on one and the same day.

(*b*) *The Senate* is composed of 300 members, the number determined by the constitution. Since the amendment of 1884 all senators are elected to office, the 75 life-senators appointed by the Senate and created by the constitution, having been then suppressed. Senators are elected from each department, their number varying from 2 to 10 according to the population. The suffrage is called *limited*, the electoral body is formed of it: (1) the *departmental representatives* (senators, deputies, general councillors); (2) *senatorial delegates* elected from among the voting citizens of each township by the municipal council and varying from 1 to 24 according to the population. These senatorial electors constitute a college that meets at departmental headquarters under the presidency of a civil magistrate. The election must end on the day of the third ballot, the first two being cast to find, if possible, an absolute and the third failing an absolute majority for a majority of votes cast. Senators are elected for nine years some of their number being renewed every three years. Hence, the Chamber of Deputies represents the people as a whole and the Senate local bodies. Gambetta called the Senate the Great Council of the Communes of France

2. *Prerogatives.*— (*a*) The members of both Chambers enjoy the same personal prerogatives, inviolability from arrest and a fixed salary. A law dated 23 Nov. 1906, raised from 9,000 francs to 15,000 ($3,000), the fixed annual salary of each member of both Houses from 1 Jan. 1907. (*b*) They exercise the same legislative privileges; adopt their own rules and elect their own committees. Their essential privilege consists, as in all other Parliaments, in *introducing* and *voting* laws. In this regard the only difference between the Senate and the Chamber of Deputies is that all finance laws must first be voted by the Deputies. All laws must be voted by each Chamber separately. Only the laws of amendment to the constitution are voted on in another fashion; for these both Chambers combine and form a congress held at Versailles. (*c*) Both Chambers assembled in congress at Versailles exercise an electoral privilege also, that of electing the President of the Republic. (*d*) The Senate alone enjoys the judiciary privilege and constitutes itself a High Court to judge the President of the Republic and ministers arraigned by the Chamber of Deputies as also individuals accused of conspiring against the security of the state (the Boulanger affair in 1889 and the Deroulède in 1899). (*e*) Finally, each Chamber exercises a similar power over the ministry through the right of *question* and *interpellation*. The latter is especially important inasmuch as the minister summoned is obliged to respond and the interpellation is followed by a vote, after which, unless he receive a majority, he must retire. Interpellation is the practical mechanism through which the ministerial responsibility is exercised. Either Chamber may further control the government by naming a commission of parliamentary inquiry (the Panama and Boulanger affairs, the condition of the navy, etc.). The Chambers, especially that of Deputies, exert a really dominant influence over the French Government

IV. **The Executive Power.**— The executive power is exercised by the President and his ministers. (1) The President is elected by Congress (Deputies and Senate combined) for seven years, being chosen from among its own members. His power is very extensive, as he can introduce, promulgate and execute laws, make appointments to all civil and military offices dispose of the armed forces and negotiate and sign treaties. But since he can exercise it only through the medium of his ministers, this extensive power is practically reduced to that of appointing his ministers. Being politically irresponsible, he can only be summoned before the High Court for felony. He resides in the Palais de l'Elysée in Paris and receives a regular salary of 600,000 francs ($120,000), with as much more for expenses incidental to official entertaining. List of Presidents of the Republic: Thiers, 1871–73; MacMahon, 1873–79; J. Grévy, 1879–88 (the only one re-elected); Carnot, 1888–94; Casimir Périer, 1894–95 (the only one who resigned); F. Faure, 1895–99; E. Loubet, 1899–1906: A. Fallières, 1906–13; R. Poincaré, 1913–20. (2) The Ministers form a jointly responsible Cabinet under the direction of the President of the Council. The latter is appointed by the President of the Republic and is free to choose his colleagues: 12 ministers — Justice, the Interior, Foreign Affairs, War, Navy, Colonies, Public Instruction, Commerce, Agriculture, Public Works, Finance, Labor — the last created in 1907. There was no change made in that list till 1915 when M. Briand became Prime Minister for the fifth time. Five Ministers of State were added to the list, without special portfolios. Under the sixth Briand Ministry the number of State Ministers was reduced to 10. The various departments were the following: Foreign Affairs, Justice, Public Instruction and Fine Arts, Interior, Finances, War, Navy, Public Works, Transportation and Supplies, Commerce, Industry, Agriculture, Labor, Postoffice and Telegraph, Colonies, Armaments and War Supplies. Ten under-secretaries of state were at the same time appointed, one to each ministry. They are the President's deputies, who in his stead sign or veto all executive documents. Their essential character is their political responsibility. They are responsible for their acts to both Chambers, whose members, thanks to the right of interpellation, already defined, can put their actions to a vote which, if it place one or more in a majority, will entail his or their resignation. Such a consequence is not explicitly declared in the constitution, but it follows in the logical order and from the practice of the government. In fact, in case of conflict between a minister and the majority, two solutions may be resorted to; either the minister's resignation or the dissolution of the Chamber, which must be voted by the Senate. Throughout the history of the Third Republic there is but one record of a like dissolution, which was that of 16 May 1876. President MacMahon had formed the conservative ministry of the Duc de Broglie in opposition to the liberal Chamber, which, by a majority of 353, refused to enter into relations with him. The Chamber was dissolved, the elections resulted in a majority of liberal votes, in face of which the conservative ministry had to submit and resign. Since then, all ministers in the minority on a matter of confidence have tendered their resignations. During the first 20 years of the Republic ministerial instability was a veritable government defect, being due to the disintegration of parties and the impossibility of constituting lasting majorities. There were, however, ministries that lasted two and even three years as, for instance, the second Ferry ministry and the Méline ministry. But within the last 10 years this instability has disappeared in consequence of the Dreyfus affair and of the new division of the parties into two blocs, the radical-socialist and the conservative. The Waldeck-Rousseau and Combes ministries each lasted three years, the incumbents retiring voluntarily, Rouvier lasted two years. After the retirement of M. Clémenceau the following cabinets were formed without causing any marked change in the composition of political parties: 1st Briand cabinet, 24 July 1909; 2d Briand cabinet, 3 Nov. 1910; Monis, 2d March 1911; Caillaux, 27 June 1911; Poincaré, 14 Jan. 1912; 3d Briand cabinet, 18 Feb. 1913; Barthou, 22 March 1913; Doumergue, 9 Dec. 1913; Ribot, 9 June 1914; 1st Viviani cabinet, 13 June 1914; 2d Viviani cabinet, 26 Aug. 1914; 5th Briand cabinet, 29 Oct. 1915; 6th Briand cabinet, 12 Dec. 1916; Ribot, 20 March 1917; 2d Clémenceau cabinet, November 1917.

National sovereignty, acquired through universal suffrage and political liberties, such as those of the press, of meeting and of association, and a parliamentary régime, that is to say, the supremacy of Parliament over the ministry, have become the groundwork of the constitution and of the political government of France.

Amendments to the Constitution and Modifications Proposed Since the German Invasion of 1914.—(*a*) *Government Proposal.*— When M. Briand formed his sixth ministry (14 Dec. 1916), he brought in a bill authorizing the government for the duration of the war, to take all steps and emergency measures which might be necessitated for the purpose of national defense, under the form of law decrees, with penalties. The committee which was appointed to make inquiries on the subject reported unfavorably on 29 Dec. 1916. "As a matter of principle," said the report, "it is obvious that sovereignty cannot be delegated; it is inalienable. Universal suffrage invests us with the legislation Power in order that we may exercise the latter at our own risks and under our own responsibility. Our constituents have given us no right to delegate such power." In fact, the government proposal concerned a change in the Constitution, and both Chambers of Parliament should therefore have been applied to by the President of the Republic. The proposal was therefore abandoned; indirectly, however, it resulted in a simplification of procedure concerning the discussions of bills, the passing of which was considered as extremely urgent.

(*b*) *Proposed Amendment to the Constitution.* The following proposal concerning a change in the constitutional laws, limited to the period of hostilities, were made by various members of Parliament: (1) That the two Houses of Parliament sit in one general assembly so that the bills should be discussed and passed as if Parliament consisted only of one house; (2) That the right of the President to dissolve the Chamber of Deputies should be suspended; (3) That Parliament should sanction all treaties signed between the Entente Allies, even before the war, whilst the Constitution of 1875 limits the powers of the two Chambers to the sanction of treaties of peace and of commerce; (4) That the parliamentary supervisions of the national defense and military operations should be exercised through a parliamentary committee consisting of 80 deputies and 40 senators elected by each House respectively.

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7. FRENCH LAW AND JURISPRUDENCE.

Origin of French Law.— French law had its origin in Roman institutions, in Germanic customs, and to a certain extent in the canon law, the latter, however, having had rather a parallel than a posterior existence during the formative period.

ROMAN ORIGIN.

Personal Status.—Under Roman institutions as they existed in Gaul during the 3d and 4th centuries of the Christian era, modern notions of liberty and equality in personal status were unknown. Slavery everywhere was rampant and even free men were not all treated on the same footing. A sort of nobility was conferred upon those who exercised a public function; in certain cases this nobility was hereditary, while in others it was merely personal. This aristocracy, with a strict hierarchy, very much resembled what we know to-day as the "tchin" in modern Russia. It possessed certain privileges, especially in regard to criminal law, but special taxes were levied on its members apart from the usual dues. On a different footing to these "honestiores" were the large body of "humiliores" comprising artisans, tradespeople, workmen and peasants. Many professions, by their very utility, were obligatory hereditary and subject to stringent regulations. The peasant formed part and parcel, as it were, of the soil, and he and his issue being inseparable from the land they cultivated, their condition was really more that of a serf than a free man.

Property.—The Roman law governing property, as applied to Gaul, maintained a strictly individual character. The landowner held absolute sway over his property exactly like the landowner of our day. The principle under which the Roman state exercised a right of "*dominium eminens*" over conquered territories had become purely theoretical. The landowner, however, was not the most envious of mortals. Excessive taxation often led him to depreciate the value of his property (cutting down vines and fruit trees for instance) in order to lighten his fiscal obligations. At times even he abandoned his land to escape the punishment of torture which was a means the authorities resorted to in dealing with refractory taxpayers. Moreover, it not unfrequently happened that the large and powerful landowners took possession of the small-holders' property without being in any way molested by the law — as harsh on the poor as it was lenient on the rich — or they would compel the small owners to sell their land. The owners thus deprived of their property were obliged to eke out a precarious livelihood as a farmer in the employ of their self-appointed lord and master if they wished to retain use of that land over which they once had absolute control.

Judicial Organization.—The judicial organization made one with the administrative organization. The governors of provinces or counties were judges of common law and the municipal magistrates exercised a right of jurisdiction over the city and its suburbs in so far as litigation on a small scale was concerned.

In view of difficulties of communication and the large area covered by the provinces, and also by virtue of an old tradition, the prefects organized circuits for the dispensation of justice. They were competent to judge appeals against decisions made by municipal magistrates, their own rulings could be appealed against before the Pretorian prefect whose decision was final if heard in the diocese where the latter exercised the functions of "vicarius," or before the "vicarius" and from his decision to the emperor if in other dioceses.

GERMANIC ORIGIN.

During the 5th century the barbarbians founded in France three kingdoms: The Francs, Wisigoths and Burgonds, and it is incumbent to note what modifications were made in the institutions of Romano-Empiric origin. To understand the subject clearly it is first of all necessary to know the essential traits of this new law, that is to say its Germanic customs resulting from the tacit consent of the people perpetuated by the ancients and not defined by written texts, as the art of writing was unknown to the barbarians.

Personal Status.— Like all ancient peoples, the Germanic tribe was made up of slaves and free men, the latter, so some authors have told us, being divided into two categories: "Ingénus" (free men) and nobles. From among the latter were chosen the kings, princes and knights, but the existence of such nobles is contested by some authors who believe that the only class opposed to the slaves were the free men — possessing no hereditary privileges, and the "lites" or semi-slaves, similar to the aforementioned farmer employees or "colons" of the Gallo-Romanic institutions of which mention is made by Tacite.

It would appear that the latter formed themselves into two groups, the serf-farmers who were kept in the country and who do not seem to have been ill-treated, and the slaves proper, such as the inveterate gamblers and debtors who were considered as so much merchandise and sold abroad.

Property.— Contrary to Roman law under which property was individual and absolute, the Germanic custom was all for collective property. Each family in the tribe received periodical allotments of land for cultivation — forests and pastures being common to all. Individual property only existed for heads of families, consisting of the ground site and land surrounding it and for certain estates which belonged to the family who had hitherto cultivated them and which remained untransferable and hereditary.

Co-existence of Roman Law and Germanic Customs.— It is still a matter of controversy whether at the time of the German invasion the Roman law would supersede the Germanic customs or vice versa. It seems that an intermediate opinion should prevail, in other words, the Gallo-Romans administered their laws in the three kingdoms founded by them as far as was compatible with a spirit of conquest. This solution, moreover, is quite in conformity with the tenets of history in so far that when two races are encountered in one country, the one relatively civilized, the other in a barbarian stage, each preserves in principle its public and private institutions so long as any real fusion is inextant. This is actually the case nowadays in Algeria, India, Indo-China, etc., and it is the principle on which all laws governing personal status are based. But in actual practice this principle led to such complications subject to litigation that gradually the two laws were incorporated into one. Thus was brought about a body of regulations composed of certain rules of Roman laws — on account of their utility — and certain rules of German law because of their simplicity.

Canon Law.— As regards Canon law, both customary and written, derived from the Testaments, the writings of the Apostles and the customs of the Catholic Church, and from prelate and papal decrees with texts borrowed by the Church from secular institutions, it left no mark of any importance on the first phases of French law. It merely followed its own course, and reference to it will be made hereafter.

THE FRANK MONARCHY.

Origin of Law.— The origin of law at this period can be traced to two sources: (1) The laws along their general lines, and (2) other data showing how the laws were applied.

There existed as many laws as peoples and they were divided into Roman law and Barbarian law, the customs of the Barbarians have ing been made the subject of law from the 5th century. As regards the Roman law this consisted of a collection or adaptation of Roman texts compiled by order of the king for his Roman subjects.

In addition to these particular laws which only applied to a particular race, there existed the ordinances of the Frank kings, called «Capitulaires» which could be applied to the entire population, and which, consequently, constituted elements for the fusion of the two laws. The most important of these «Capitulaires» were due to Charlemagne, and show the remarkable activity displayed by this great emperor.

The documents which show the manner in which the laws were applied under the Frank monarchy consist *inter alia* of a series of forms intended for the use of practising lawyers which served as models for the drawing up of deeds and other legal instruments; «cartulaires,» or registers, in which administrators of churches and convents recorded the rights of ownership of the different property in these establishments; and «polyptyques,» wherein were registered in detail all the property belonging to the large landowners.

Personal Status.— From the point of view of personal status, the Frank period showed great diversity, the cause lying in the co-existence and fusion of the two Roman laws and the German law. It is true that the people were still composed of free men, semi-slaves and slaves proper, but the quasi-servile population comprised a number of different classes.

As regards the free men, the nobility proper gradually disappeared, but a new aristocracy sprang up. The Roman nobility was replaced by the «Seniorat,» which was a class composed of influential property-holders and important state officials.

The quasi-servile population was made up of the «colons» of the Roman customs; the «lites» of the Germanic institutions — a large number of enfranchised men over whom the Church exercised a patronage and a right of jurisdiction, and finally those people who had been driven by misery, hunger and debts to forego a part of their liberty. By degrees the various elements composing this semi-servile population developed into serfdom proper, a feature which will be dealt with later.

Under the influence and protection of the Church, the position of the slaves became bettered in some respects. Although they possessed no personal status from a judicial standpoint, they were able to contract legitimate marriages and their masters were no longer able to confiscate the meagre savings of their toil. It even came to pass that the slaves were placed on the same footing as the «colons,» which greatly enhanced their hitherto precarious position.

Marriage, the cornerstone of family, was in those days quite a different institution from that understood in modern times. Sold by her father to her husband, the German woman had no other choice than to bow to the inevitable, she being in no way consulted in the matter. As regards the Roman woman, although her consent was necessary so also was her father's, with the result that a trace of barter and sale still survived. Similar formalities applied to only sons.

In the 8th century any marriage contracted without the father's consent was not valid. It was at the beginning of the 9th century only that the idea of mutual consent was seriously mooted — to the advantage of both husband and wife. As regards divorce, which existed under both Roman and German law, the Church endeavored to suppress it, and so far succeeded as to substitute for it a judicial separation. «Capitulaires» of the 9th century were very strongly opposed to divorce, but its complete disappearance never resulted.

Judicial Organization.— Justice was dispensed in the provinces by the «Count» who was also invested with administrative and financial functions. The count went from canton to canton dispensing both civil and criminal justice. He was assisted by «rachimbourgs»* or officials appointed by him which Charlemagne replaced by «echevins» (municipal magistrates) who differed from the former by their permanent character. Furthermore, all cases were heard in public, anyone had the right to attend, and, as Grégoire de Tours has shown us in an interesting chapter in one of his works, the public manifested audibly their approval or disapproval of judgments rendered. This was an old remnant of popular justice as practised under German customs.

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* "Rachimbourgs" were officials attached to the "Count" when the latter dispensed justice. They were not empowered to pronounce a sentence, but merely to see that the law was properly applied, and especially to satisfy themselves that cases were duly proven.

The king, assisted by a council, personally dispensed justice wherever he went. In principle he was not a judge of appeals, but he could be referred to in a case of «déni de justice» (refusal of justice). He was, moreover, the supreme judge as it were, and had power to pronounce judgment in all cases pleaded before him, even in first instance. It has been said that his tribunal played the rôle of a school of equity, amending certain hard and fast texts of the legal code.

TRANSITION BETWEEN THE FRANK AND FEUDAL PERIODS.

Vassalage.— From an individual point of view it was the institution of vassalage which served as transition between the Frank and Feudal periods. From the 8th century onward documents and legal texts make mention of persons called *Seniores*, who exercised a legal authority over other men qualified as vassals. Anybody from the king to the humblest subject could be a *Senior*. The vassal himself could have vassals which the *capitulaires* designated by the name of vassal's vassals or *vavasseurs*. The vassal was under the obligation of serving his senior all his life: Certain duties are mentioned in texts (accompanying the senior when traveling, guarding his house, lending him armed assistance, etc.), but the enumerations were not specific. On the other hand the senior was the vassal's attorney so to speak, and if a third party made any claim against the vassal it had to be addressed to the senior who saw that justice was done. In 847 Charles le Chauve ordered all his subjects to choose a senior; but his orders were not everywhere carried out; some of the free men refused to submit to this edict, with the result that their property became what was afterward called allodial or freehold.

Land Concessions.— The concentration of land property constituted a second aspect of the transition from the Frank to the Feudal period. The small landowners were generally ill looked upon by the counts who employed all kinds of devices to force them to sell their property. On the other hand, the large landowners often conceded part of their land for life with a view to developing their political and social influence vis-à-vis their tenants, and these concessions, which at first were leased on a life basis, ended by becoming hereditary — at least in fact. Thus it came about that Charles Martel conceded gratuitously to the lords of the realm, as a gift, i.e., without compensation, property which he had wrested from the Church. Any land concession created a link of vassality between the two contracting parties. From this link arose from the Frank period a new judicial organization, the expansion of which will be witnessed during the Feudal period.

FEUDAL SYSTEM.

Personal Status.— Leaving aside the clergy and the bourgeois, the feudal society was divided into three main classes: the nobles, the commoners and the serfs.

Feudal nobility was hereditary. As a general rule the free man or the commoner was made a noble if land was conceded to him, in other words becoming a vassal; as also any person knighted for military prowess. Later on nobility was more sparingly conferred, and only the king was entitled to grant it, for which he made it the occasion to levy a tax on such appointment.

The commoners did not enjoy the same privileges as the nobles, but they were not handicapped to the same degree as the serfs; they were able to acquire property called commoners' tenures and were always free to choose their domicile.

The serfs were the descendants of the slaves, colons, lites, and even of certain free men of the Frank period. They differed from the slaves proper in that they had a judicial status and were able to enjoy a patrimony and raise a family. They differed from the colons in that they were not bound to the soil, that is, to a certain specified piece of land; some of them were, as a matter of fact, attached to the personal service of their lord and master: In this way arose a *real* servitude and a *personal* servitude. The serf owed many arbitrary duties to his lord, such as talliage, capitation tax and manual labor. If he desired to marry outside the servile population he was obliged to obtain the consent of his lord; children born of a serf and a free woman were free in principle, at least such was the case in many districts.

While free to acquire and sell servile tenures and sometimes commoners' tenures, the serf could not, at the outset of the feudal period, bequeath them, although on payment to the lord of a fee such property might be left to the next of kin. As time went on this rule became less strict and in certain districts the serf was allowed to bequeath his property to a certain extent.

A free man became a serf if, for instance, he was unable to repay a theft or if his father, on his deathbed, made it over to the Church; on the other hand the lord had the privilege of enfranchising his serf, but if the lord himself was a vassal the consent of his directly superior lord was necessary.

Property.— The land was divided into allodial tenures and feudal tenures, these in turn being subdivided into three groups: fiefs or noble tenures, fee-lands or commoners' tenures and servile tenures. Note «en passant» that a tenure is a parcel of land which is split up into two parts, the reversionary interest (dominium eminens) belonging to the assignor, and the enjoyment of the property (dominium utile) to the assignee.

At first the fief was untransferable and carried only a life interest, which, however, gradually became hereditary and transferable. In order to inherit from his father, the son had to swear act of fealty to his lord and pay him a tax on the inheritance equal to one year's income. The birthright was a rule strictly applied although certain customs admitted the concession of a part of the fief to the male children other than the eldest son; in collateral line the right of masculinity had the effect of making the younger brother the heir to the detriment of the elder sister. The object of these measures was to prevent the estate from being parceled out indefinitely. Contemporary legislation at the commencement of the present century was not favorably impressed with this system. When the fief was sold by the vassal the lord reserved for himself one-fifth of the price; the fief could be reacquired by reimbursement of the purchase price.

The commoners' tenure entitled the lord to taxes in kind and to an annual quit-rent in cash, both specified in the lease contract. As regards taxes due under servile tenures it is known that these were left to the decision — often arbitrary — of the lord.

By «alleu» or «franc alleu» (allodial-freehold) is meant free land, i.e., that over which the owner had an absolute right, there being no question of lord or tenant. In provinces where customs prevailed infeudation was presumed, while in provinces governed by written laws allodiality was taken for granted. However, by an edict of 1576 the king proclaimed himself sovereign «fieffeux» throughout the kingdom, which resulted in all allodial tenures being placed under his suzerainty. The famous King of Yvetot — of legendary history — was merely the owner of an allodial tenure of very little consequence.

Judicial Organization.— During the feudal period the idea of justice was vastly different from our modern and unitarian conception of it. A distinction had to be made between municipal, ecclesiastical, feudal and royal justice.

Municipal justice existed in certain urban communes which also enjoyed some other privileges, such as the suppression of serfdom and arbitrary taxes, immunity from unwarranted arrest, etc. Any proceedings instigated against the «bourgeois» were as a rule brought before the municipal magistrates, aldermen, jury, etc. However, even in the communes enjoying the greatest liberty the lords still retained certain judicial powers. Note that the modern French tribunals of commerce have a precedent in the «Parloir aux Bourgeois,» which was a corporation composed of privileged merchants who were vested with authority to decide all trade regulations or any branch thereof.

Ecclesiastical justice, already extant under the Frank monarchy, reached the zenith of its power during the feudal epoch. It was founded on the diminution of civil power and the obscuration of the notion of state. Its characteristics were a practice of Roman and Canon law, numerous degrees of appeals and relative guarantees for litigants, which rendered it more flexible and equitable than other jurisdictions. It was not executory on either persons or property, but assured the application of its sentences by threatening refractory lawbreakers with excommunication.

The lord had a right of justice, both civil and criminal, over all his subjects whether serfs or commoners. What was called God's Judgment was often resorted to in an endeavor to obtain proof of culpability which consisted in the accuser and accused being thrown into a reservoir of water, hands and feet tied, and whoever floated was deemed to be the guilty party and convicted. Saint Louis, at the instigation of the Church, subsequently suppressed this barbarous custom. The lords themselves were tried by their peers, who met in the Feudal Court of their common Liege and under his presidency.

In the sixth part of this work we will examine the principles of royal justice, it not being possible here to establish — or only factitiously so — the limit between the feudal and royal periods.

Law of Customs and Roman Law under the Old Monarchy.

Here again it would be imprudent to draw a hard and fast line between the feudal and royal periods. The subject is one, moreover, of sufficient importance to justify a special chapter being devoted to its study.

Under the Frank Monarchy, law was of a personal character; Germanic customs had been made the subject of written legal texts, and the old *capitulaires* were henceforth but a memory of the Moyen Age. Custom alone was the order of the day from the 10th to the beginning of the 12th century, a period moreover in which chaos reigned supreme. A renaissance of Roman law appeared aside the Custom law, either co-existing with it or resisting it and sometimes even replacing it. Furthermore, from the 14th century onward, kings began to make laws by means of royal ordinances. Canon law was improved on and became more completive, exercising over the other Roman and Royal Customary laws a reactionary effect of an often satisfactory nature.

Customary Law.— In principle, customary law was applied to the northern and central provinces (Alsace excepted) and Roman law to the southern provinces. But where in the north and centre custom was mute, recourse was had to Roman law to settle controversial disputes. Although the countries placed under Roman law were considered as being governed by written laws, it should not be concluded that in matters of custom oral traditions prevailed up to the time of the Great Revolution. These customs, which had been strongly influenced by Germanic law, were first made the subject of written legal documents, compiled privately by legal institutions — such as the *Etablissements de Saint Louis* — and afterward officially recognized by decree of Charles VII at Montil-les-Tours in 1453. Gradually the divers customs were all incorporated into written texts, and Louis XIV in 1679 ordained that they be taught, like the Roman law, in all the universities throughout the kingdom.

The customs were territorial, contrary to the laws and customs of the Frank Monarchy, which were of a personal character. They were moreover numerous. Some of them were widely disseminated, extending for instance to a whole province: Brittany, Normandy, Berry. There were some 60 of these general customs. Besides these there existed the minor customs called local customs applicable to particular cases, by derogation to a general custom, and governing only a small district, sometimes merely a single town or village. Their number was about 300.

Of all the customs those of Paris rapidly acquired preponderance, and ended by being considered as representing the common law of the kingdom, applicable in case of muteness for other customs. This privileged situation arose from the following causes: Paris was the capital of the kingdom, its parliament, whose resorts were vast, exercised a great influence over the jurisprudence of the provinces, and was, moreover, the principal centre of the legal profession.

Roman Law.— During the feudal period and the absolute monarch period Roman law was studied, not out of idle curiosity from an historical point of view or as a legal education, but because it was law actually in force (like to a certain extent in Greece at the present time).

Up to the 16th century, Roman law was but little known; there only existed the texts comprised in the *leges romanorum* of the French monarch. But toward 1150 Imérius, professor at the Bologna University, discovered at Pisa the works of Justinies and included them in the curriculum of his students. This was a filip so to speak. In the south of France where the population was really governed by Roman law, Roman doctrines were even more brought to the fore and their principles adopted. In the provinces where written laws prevailed, the "Digeste," the "Code de Jerusalem," the "Institutes" and the "Nouvelles" acquired the status of actual codes. In cases of contradiction between the texts the most recent one prevailed.

Despite its power, Roman law was nowhere the only one applied in the south of France; in provinces governed by customs, Roman law was applied if the customs were mute, while in provinces where written law prevailed customs settled all points not provided for by Roman law. These customs, moreover, were local ones except, however, those pertaining to Bordeaux or covered by the Provincial Statutes.

Royal Decrees.— From the 16th century onward the kings undertook the task of unifying the law throughout the country; this was done with the object of facilitating the administration of justice, hampered by the multiformity of the Customs and the judicial confusion resulting from their coexistence with the Roman texts. Its further aim was to conciliate the "États Généraux" (General States), which had showed a marked tendency toward centralization.

The Decrees covered a multiplicity of subjects: administration, civil procedure, criminal procedure, etc. Many of these Decrees bore the signature of François I, Charles IX, Henri III and Louis XIII.

Special mention should be made of the Code Michau, a decree compiled in 1629 by Chancelier Michel de Marillac from the records of "Etats Généraux" of 1614 and the Assemblies succeeding it. It was a considerable work for the epoch, comprising as it did 461 articles. But this initial trial at codification, despite undoubted and useful reforms, encountered parliamentary resistance which accepted these innovations with a bad will, modified them in every possible manner, and in some cases even ignoring them.

Under Louis XIV, and particularly due to the untiring efforts of Colbert, the unification and codification of French law made great strides. The most important matters covered were publicity of mortgages, land and water, civil procedure, criminal procedure, trade regulations, etc. Many of the articles of the present day French code have their origin in these decrees. Colbert's work was carried on under Louis XV by the Chancelier d'Aguesseau to whom we are indebted, *inter alia,* for two very important texts regarding deeds of gift and legacies.

Canon Law.— Canon law held the foremost place in the universities, and every serious barrister made it a point of honor to become a *doctor in utroque jure* of both Roman and Canon law.

The latter alone was applied by the Ecclesiastical Tribunals, unless modified by Royal decree, as for instance from 1667 to 1670 the two decrees covering civil and criminal procedure were substituted in the aforesaid Tribunals for Canon law which had previously prevailed.

Canon law also played a rôle in the secular tribunals, account being taken concerning those institutions under the protection of the Church, or interests involving the salvation of souls ("salut des âmes"). To the Influence of Canon law was due the prohibition of the rate of interest which was maintained in principle up to the Great Revolution, various rules governing legacies and numerous other forms of procedure such as matrimonial legislation, etc., all incorporated in the Decrees of Louis XIV.

The Absolute Monarchy.

Personal Status.— The tripartite division of the people into nobles, commoners and serfs was maintained in the Absolute Monarchy as during the feudal period. However, notions of equality made progress and the commoners' class endeavored to establish more and more firmly a régime of common law.

Nobility was no longer dependent upon the ownership of a fief, but was a purely personal quality. Privileges which resulted in a state of private law and its procedure largely disappeared. The noble was nothing more than a subject of the king. He did, however, retain certain privileges, such as fiscal exemptions, sweets of office, immunity, in case of conviction, from flogging or the gallows, etc. Nobility was bestowed by royal favor; it was forfeit if infamous condemnations were incurred, or if certain professions were exercised, such as mechanics arts (except glass making), laborer's work, trade (except on the sea), etc.

As regards serfdom, this became a state more and more exceptional, whereas during the feudal period it constituted the condition of the great majority of the workmen of the towns and the agricultural population. The lords had, in fact, proceeded with enfranchisements on a large scale, either out of a feeling of piety or for remuneration; certain enfranchisements were even collective, as is illustrated by the charters of numerous towns. Furthermore the tribunals searching proof of a state of serfdom with the result that serfs became fewer and fewer. Finally, the customs, by their very nature, brought about the disappearance of serfdom by abolishing those laws that had fallen into disuetude characteristic of the servile condition. The old slave had become a serf, now the serf had become a commoner.

Property.— Three kinds of feudal tenures existed during the latter centuries of the old régime, i.e., the noble, commoners' and servile tenures. They were maintained despite the fact as regards the latter that serfdom was less and less prevalent. In respect to the feudal tenures these became a form of landed property: the liens between the lord and the vassal were relaxed, the obligation of fealty to which the latter was held in respect to the former being now merely of a platonic character. Pecuniary taxes — really rather heavy — alone remained, that is, those dues on the fief to the profit of the lord.

Besides these feudal tenures which the Revolution abolished without indemnity, there existed during the Absolute Monarchy land-owned tenures, consisting either in the detinue of a parcel of land by virtue of a perpetual lease or long term lease, or in the ownership of land from which permanent income was derived. The most common land-owned tenures were the emphyteuses and the income-bearing leased property. Modern French law admits these modalities of ownership and detinue but their economic importance to-day is very small.

We may dismiss the "alleu" or freehold tenure which was legally abolished and practically inextant on the eve of the Revolution, and add that the feudal form of ownership of land was maintained until 1789 considerably impeding the circulation of property.

Commerce and Industry.— Commerce and industry, which had played but an unimportant rôle in the feudal period, developed on a large scale during the latter centuries of the old régime.

In fairly important towns the trades were subject to a strict set of rules, to which the "Assemblée Constituante" attributed in 1789 the maximum of liberty. Artisans and merchants were grouped into corporations; each corporation had its own exacting rules fixing the conditions of manufacture, quality, products, etc. In order to become an artisan or merchant quite a long apprenticeship had to be served, a professional examination passed and heavy fees paid. This system resulted in the realization of large profits and high wages by curtailing competition and guaranteeing the quality of the goods manufactured and sold. But exaggeration resulted: formalities and regulations succeeded each other to such an extent that various economists, known by the name of Physiocrates, repeatedly demanded liberty in trade and manual arts. In 1776, at the instigation of Turgot, the king issued an edict by the terms of which corporations were suppressed, but this met with such disapproval from the Paris parliaments and public opinion that it was repealed.

Industry proper, which in France dates from the time of de Sully and de Colbert, was subject to another régime, that of monopoly. The king alone could authorize the establishment of a factory; he granted the exclusive right of manufacture, for a specified district, and often fixed the condition of fabrication and sale as well as the prices.

Monopolies and corporations alike were, however, doomed to disappear by dint of the great revolutionary crisis and cede their place to a more equitable system, the basis for which existed, moreover, and was to be found under the old régime, to the undoubted benefit of the tradespeople and artisans of communes with a limited population.

Judicial Organization.— The latter centuries of the old régime witnessed the progressive diminution of the power of the lords, the clergy and the municipal authorities and the gradual development of Royal justice. To the multiplicity of existing jurisdictions a tendency arose to substitute a system of unity — a status definitely realized moreover by the Revolution. Royal efforts were directed mainly on two principal points: submit to its tribunals those cases previously submitted to seignorial courts and subordinate the latter in every instance to the control of the former, notably withdrawing from them the right to pronounce judgment in a final appeal.

Royal justice had been dispensed since the Capetians by provosts, or officials who besides rendering justice recruited soldiers for the army and collected taxes. Philippe Auguste made them subordinate to "baillis" (bailiffs) in the north of France, and to "sinechaux" (seneschals) in the south; bailiffs and seneschals fulfilled a triple function, judicial, financial and military. Gradually the provosts confined their rôle to that of magistrates, and the bailiffs, whose duties were less and less arduous, ceded their judicial functions to their two assistants, one civil and the other criminal.

The king in his quality of supreme suzerain presided over a feudal court called *Curia Regis*. At first the great vassals of the Crown were members of this court, but they soon wearied of its sittings especially when written proofs were substituted for the traditional judicial passage of arms.

They were replaced by *Juris-consults* and the *Curia Regis* became the parliament which was subsequently to decide the appeals against the decisions of the bailiffs and afterward those of the Court of Judicature at a time when the intermediary tribunals were intercalated under Henri II between the bailiffs and parliament.

Parliament consisted of four Houses or Chambers: the "Grande Chambre" which dealt with matters pertaining to the king or the peers; the "Chambre des Requêtes," which pronounced judgment on persons privileged to be tried directly by Parliament without appearing before the lower courts; the "Chambre des Enquêtes," which tried suits drawn up in writing; and the "Tournelle," which was solely concerned with criminal cases. All appeals against decisions of the "Chambre des Equêtes" were pleaded before the "Grand Chambre."

Thirteen other parliaments were established in the provinces. Justice also comprised special tribunals such as consular tribunals instructed to settle points in litigation connected with commercial legislation, and admiralty tribunals whose function consisted in applying maritime law.

Many public functions, and particularly the judicial ones, constituted offices bought from the king from which he derived quite a substantial revenue. These payments subsequently became hereditary on payment of a tax. However, the mercenary manner in which these offices were granted and their hereditary nature gave rise to such abuse that the Revolution suppressed them altogether.

As the compensation allowed was very small, the magistrates accepted from suitors what were called court-fees, consisting really in the gift of various articles and especially cash. Racine's play 'Les Plaideurs' throws an interesting light on this old custom.

The judges and counsellors-at-law naturally dispensed judgment in the name of the king, the latter reserving to himself the right to call before his own council any action pending before any tribunal. This prerogative was a relic of the old system of justice dispensed directly by the king, such, for instance, as that rendered by Saint Louis under his oak tree. It was also the King's Council, or at least one of its sections the "Conseil des Parties," which judged cases of appeals.

Legislative Power.— The legislative power, like the judiciary power and the executive power, belonged alone to the king. It is true the "Etats Généraux" collaborated with him to a certain extent in that they made him acquainted with the desiderata of the three orders: nobility, clergy and laymen, of which the population was composed. But from 1614 to 1789 there were no "Etats Généraux" and the king was not actually obliged to give satisfaction to the wishes of his subjects.

Contrary to the "Etats Généraux" the members of the "Assemblées de Notables" were not elected but appointed by the king. They also were only empowered to make suggestions or express opinions.

The Royal Decrees were, however, only executory after having been registered by Parliament. The latter took advantage of this to address remonstrances to the sovereign, who nevertheless could ignore them and force Parliament to register the decree by means of the ceremonial known as "lit de justice." On many occasions Parliament endeavored to undermine the autocratic power of the king: the conflict was particularly bitter under Louis XV who banished the Paris Parliament and annulled the Provincial parliaments. Louis XVI was merely able to restore order temporarily and eventually he prorogued Parliament and summoned the "Etats Généraux" in 1789, which put an end to the old régime.

Parliament also participated in the legislative power by means of decretal decisions; when that one of its rulings was likely to cover frequently arising questions, it was formulated in general terms and such formula was deemed to be law. This method of fixing jurisprudence has been removed from French legislation since the Revolution as being contrary to the principle of the separation of powers.

INTERMEDIARY LAW.

General Summary of the Work of the Revolutionary Assemblies.— The legislative work of the Revolution has been qualified as intermediary law as it formed the transition between the old French law and the new, the law covered by the Napoleonic codes.

The intermediary period is by far the shortest with which we will deal in this treatise. It extended from the re-establishment of the "Etats Généraux" (1789) to the promulgation of the Civil Code (1804).

It is characterized above all by the abolition of what remained of the feudal period, of the laws and customs existing between private parties, of privileges which had been inaugurated to the profit of certain lands and certain persons few in number.

We will cite the principal judicial reforms accomplished during this troublous period; never has the legislator been so active or accomplished more in any country at any time. And yet war abroad in addition to civil war did not render his task any the easier.

Personal Status.— Among the many instances of progress realized by the Revolutionary Assemblies the foremost place is held by the protection to individual liberty and the establishment of equality for all. The year 1789 witnessed the extinction of caste and rank in France — henceforth everyone is citizen.

Of the measures concerning personal status the most interesting were suppression of paternal authority over majors, institution of divorce, which had been forbidden by the Catholic Church about the middle of the Moyen Age, and the organization of a social state, or rather its secularisation, as the clergy hitherto instructed to look after this very often carried out their task in a manner which left much to be desired.

Property.— Here again it is necessary to give prominence to the extraordinary transformations to which French law was subject during the next 15 years. The French Revolution carried on actively the enfranchisement of the land and the reorganization of property. Property once more became free and absolute; the owner had the absolute right of sway over his property. The numerous taxes to which the land was subjected during the feudal period were entirely suppressed; the distinction between *dominium eminens* and *dominium utile* disappeared; all those vexatious dispositions, both arbitrary and traditional, which hampered the sale or transfer of property were abolished.

For the privileges of birthright and masculinity existing under the feudal period, the Revolutionary law substituted the principle of equality in regard to inheritance, a principle by the way still opposed at the present time by the conservative party.

The privilege of contracting loans bearing interest, contrary to the precepts of the fathers of the Church and the scholastics, was proclaimed, to the great advantage of the economical and commercial development of France. In 1795 a mortgage law was promulgated establishing the system of mortgage cedules, an idea, moreover, which was adopted many years later by Australia (Act Torrens). In regard to alienations of property the method of transcription was adopted with the object of giving them publicity. Very numerous other reforms have left their trace on French law as practised to-day.

Judicial Organization.— The Constituent Assembly abolished the old magistracy and created in its place local tribunals which subsequently developed into civil tribunals for all districts, which is the jurisdiction prevailing at the present day for common law. It instituted the court of cassation as well the establishment of a jury for criminal cases.

For the state of anarchy and confusion extant under the old régime the Constituent Assembly substituted the system of separation of powers, being inspired in this direction from

Montesquieu and the principles applied in England. The judicial functions were hereafter separate from administrative functions.

Assuredly one of the most democratic and much debated reforms of the Constituent Assembly was election to the office of magistrate, but this measure was rescinded and substituted by government nomination.

CONTEMPORARY FRENCH LAW.

Civil Code.— It is from the Civil Code that contemporary French law really dates. Its application was of an international character inasmuch as the example set by France was followed in principle by many other countries, and in Belgium to-day the Bonaparte Code forms the basis of its legislation.

The legislator of the Revolutionary period had proposed to codify the civil laws. In 1793 Cambacérès presented two projects to the *Convention* followed by a third to the *Conseil des Cinq Cents*. An impetus was given. That which neither the old Monarchy nor the Revolution — a prey to civil and national war — had not been able to accomplish, despite repeated efforts by eminent jurists, Napoleon realized, and in so doing gained for himself everlasting fame and the admiration of the entire legal profession.

The Civil Code, which contains 2,281 articles, was definitely promulgated by virtue of the law of 21 March 1804. Its principal authors were Portalis and Tronchet who, with their collaborators, took inspiration from the old Customs, especially those of Paris, from the Roman law, the Royal Decrees and the laws of the Revolutionary period, as well as in a lesser degree from the jurisprudence of the Parliaments and Canon law.

From the old Customs law arose in principle rules governing inheritances, community of property between husband and wife; from Roman law the régime of property, general regulations covering obligations and contracts, the dowry system; from the Royal Decrees laws governing legacies and wills; from the Revolution the fixing of the majority, the marriage laws and the disposition regulating mortgages.

It is generally admitted that the Civil Code presents great qualities of unity, method, precision and clearness, but at the present day it is reproached, despite the numerous amendments made to it, with being somewhat old fashioned and not capable of solving satisfactorily the numerous problems which have arisen since its promulgation, and to its not having developed sufficiently to conform to the economical life of the country. Among the subjects it did deal with and which to-day are of primary importance are those questions of insurance, personal property and moralist controversies.

Other Codes.—Napoleon doted France with four other codes besides the Civil Code, although of much less value. These were the Civil Procedure Code, Commercial Code, Criminal Instruction Code and Penal Code; the first mentioned was instituted in 1807, the second in 1808 and the two latter in 1811.

The Civil Code owed its great qualities to the fact that it represented the accrued work of several generations; the compilers of the other four codes were handicapped to the extent that they did not possess any model — incomplete or otherwise — on which to form a basis adequate to contemporary needs. Their elaboration was less skilful and their authors less competent. Of the four the Commercial Code is the least satisfactory, representing as it does far too many ancient texts, such as the decree of 1673 regarding trade and that of 1681 on the marine. Colbert's legislation, of more than two centuries date, forms even to-day the basis of the Commercial Code, whereas trade has developed with a remarkable rapidity and undergone most varied and unforeseen transformations.

Mention should also be made that French law has become enriched since Napoleon with four other codes: the Military Code, the Forest Law Code, the Rural Code and the code governing employment, the two latter are not yet complete, only certain articles up to the present having been voted. And yet the first article of the Rural Code is dated 20 Aug. 1881.

Legislation since the Civil Code.— The five codes instituted by Napoleon are in operation at the present time and form the basis of contemporary French law. Many of their articles have been suppressed, improved upon or completed, while on the other hand many other laws, civil, commercial, etc., have been voted which supplement the Civil Code.

We have not here the pretension to outline the complete list of the legislative texts drawn up during this period covering more than a century. It will suffice to indicate the most important modifications and reforms.

The question of divorce had been settled in the affirmative by the Civil Code. For religious reasons the Restoration had abolished it, but the Third Republic reinstated it in 1884, due largely to the energetic efforts of the late Alfred Naquet.

The industrial revolution of the first half of the 19th century exercised over French legislation a powerful influence; it contributed to the formidable development of incorporeal personal property, the rise in the value of urban real estate with the consequent crisis in rural property, and finally the growing importance of the working classes.

The legislator had to ameliorate the system of land ownership by the following methods: the creation of mortgage loan societies, publicity of transfer of real estate and improvement in regard to mortgages generally. Concerning personal property mention should be made of the various laws relating to corporations and particularly to joint stock companies, measures respecting lost or stolen securities, safekeeping of securities belonging to persons unqualified to guard them or in wardship, etc. The working class finally benefited by the recognition of trades union and the facilitation of their right to acquire property.

Other provisions were made with a view to improving the lot of illegitimate children to facilitate marriage (marriage by procuration exists since the war), to increase the list of professions open to women, and to extend cases of indistrainability, etc.

The Civil Code as well as the other imperial codes need to be entirely revised with a view to the incorporation in them of new dispositions having a civil, commercial or personal character. At the beginning of the 20th century it was expected that these reforms would soon be effected; a commission was appointed in 1904 on the centenary of the Civil Code, to prepare such revisal. However, no results were forthcoming from this effort, but it is to be hoped that after the war France will make it a point of honor to have as complete and perfect as possible codes commensurate with actual economical developments.

Customs.— The Customs which played such a large part under the old régime ceded the place to written law. In principle they could no longer be considered as constituting a source of legislation. However, in certain cases the legislator took into account existing customs (urban servitudes, vicinity relations, lease rents); on the other hand commercial usages not having been abolished by the Commercial Code remain in force provided always that they are not contrary to a legal text. But in many respects the dispositions contained in the codes are so insufficient that the French Tribunals are often obliged to have recourse to the old texts which constitute an important stock of customary rules which enrich, consequently, the legislative system of France, such as the "action paulienne" (right of creditors to revoke fraudulent acts of their debtors) and the dotal system.

Jurisprudence.— By jurisprudence is meant the manner in which the laws (and the Customs) are interpreted by the Tribunals. It is a rule of modern French law that no one court decision can bind either the same court or another (even of higher degree). The result of this is a great variety in the decisions and judgments rendered.

However, a certain unity of jurisprudence has been established by the institution of an unique Cour de Cassation which considers legal texts from a purely legal point of view without regard to fact. On the one hand the judges do not care to pronounce a judgment contrary to former findings of the Cour de Cassation in an identical case, on the other hand the Cour de Cassation may, at a sitting of all the Chambers, impose its point of view and decision on a Court. This is by virtue of the law of 1 April 1837 by the terms of which if the decision rendered on a returned appeal after a premier cassation is similar to such decision the case is heard again before the court whose finding, rendered in solemn audience, binds the new appeal.

French jurisprudence cannot modify legislation, but in numerous cases it can often make it more elastic and adapt it to modern conditions without violating legal texts.

Judicial Organization.— In France the common tribunal is the District Court which decides civil litigation. Under the name of "Correctional Tribunal" it applies the penal code. Below these courts there exists in each "canton" a justice of the peace who alone decides in first or second instance cases of an unimportant character. If appeal is brought against his decision it is heard before the District Court whose decision is final. The justice of the peace, fulfilling the rôle of a simple police court, is empowered to deal with minor offenses, inflicting fines, etc. The Appeal courts (in principle covering several districts) deal with appeals judged in first instance only by district courts. There cannot be two successive appeals, the aim of the legislator being to do away with exaggerated delay necessitating extremely heavy costs.

Besides the civil tribunals and appeal courts there is the Public Ministry whose duty it is to watch over the interest of the public. These magistrates, unlike the regular sitting judges and counselors, are liable to dismissal, the judge or counselor alone being independent of executive power in order to respect the principle of separation of powers.

The highest degree in the judicial organization is the Cour de Cassation which, as we have seen, unifies jurisprudence to a certain extent. Its members show great impartiality and are thoroughly versed in law.

In France, as in several other countries, commercial causes are not always brought before the civil courts but are decided by special tribunals, commercial tribunals, a precedent of which is to be found under the Monarchy period. These tribunals are composed of merchants elected by their fellows. The election system which also exists for the nomination of workmen and masters to the "Conseils de Prud' hommes" (Trade Councils) whose task it is to settle controversies between employers and employees, is not followed for civil magistrates who are appointed by the President of the Republic.

Trade councils and commercial tribunals only exist in the large commercial and industrial centres; in other districts they are replaced respectively by justices of the peace and district courts.

Matters of an administrative nature are also decided by special courts, "Conseil de Préfecture" and "Conseil d'Etat," which fulfil rôles of first instance, appeal and cassation courts.

The penal law is applied, as we have seen, by a judge of simple police (minor offenses) and the Correctional Tribunal (delinquencies so called). More serious affairs (crime) are dealt with by the Assize Court, composed of magistrates and a jury of 12, the nomination of the latter being a fairly complicated operation.

Legislative Power, Laws and Decrees.— In conclusion we will devote a few lines to the organization of the legislative power in France as it exists to-day. Two kinds of law exist: constitutional laws, voted by the two Chambers sitting conjointly in National Assembly, and ordinary laws voted by the Chambre des Députés and ratified by the Sénat.

Initiative for laws belongs to the President of the Republic and members of the Chambre des Députés and Sénat.

Laws regularly voted are only enforced once they have been duly promulgated and published by executive officials who are responsible for their application.

The decrees of the President of the Republic are often criticized as being practically the same as laws. This, however, is not the case, as the laws alone are *the* law, whereas a decree defines the details for the application of the law; furthermore a French law is always presumed to be constitutional, and this presumption is incumbent on the judicial authorities; being the contrary of American law, according to which the courts can refuse to take into consideration an unconstitutional decree.

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8. FRENCH SOCIALISM. Socialism is an international theory. The same doctrine, the same conception of property, that is, is laid down by socialists in all countries. But every nation has produced its own form in the development of this doctrine, and these forms have been determined both by historical traditions and by the economic medium in which they have appeared.

Two traits have distinguished French Socialism from the rest. The first is that its character is strongly political, by which is meant that it is perpetually attempting to arrive at the government of the state, the second that it is continually animated by an active hope of immediate success in that effort. The French proletariat has (since the French Revolution) been mixed up with most of the decisive political struggles. It was the proletariat which dominated the Commune of Paris in 1793, and thus indirectly dominated the Convention. The French proletariat had, therefore, at the beginning of the modern period, already put its hand upon the central lever of the Revolutionary power. Somewhat later when the energies of the Revolution began to sink, it was among the populace, among the working people (who were already filled with the communistic spirit) that the vital forces of the Revolution were maintained; and the hopes which the proletariat entertained at that moment were of the most vigorous sort. The program at the close of the 18th century is summed up in the name of Babeuf. Babeuf did not look upon himself as the head of a mere party — it was in his character rather to depise party, because party always looks for its success to some chance hazard on the political field: it was rather his object to take up again the whole effort of democracy at the point where Robespierre (q.v.) had left it, and to widen it beyond the limits which Robespierre had assigned to it. It was his object to free those energies of the Revolution which had been captive since Thermidor. Babeuf believed the proletariat ready to assume and capable of assuming the responsibility of governing France, and had his conspiracy succeeded he would have changed the destiny of the country. The present writer has been told by a friend of Gembetta's that in his youth, when that leader had just come to Paris, he said freely «If Babeuf had won, the world would have been saved.» It would indeed have been saved from the counter revolution, from militarism and from the Napoleonic dictatorship, and a democracy which should have been based upon egalitarianism and alive with enthusiasm would have proceeded in peace to the organization of labor.

The note of all this is that at the very beginning of modern history the French proletariat had ceased to be «underground» as it were in the state. It thought itself strong enough for the highest tasks and it is this hope and this power of action which are continued obscurely or brilliantly in France throughout the whole of the 19th century. The proletariat recovered these hopes of theirs and put them forward again in a lively manner during the «Days of February» in 1848, on which occasion it was a socialistic inspiration which, for a moment at least, was the driving force of the second revolution. Even the terrible reprisals of June did not destroy the historical pride of the French proletariat. The day after the disaster it restated its leading idea and regathered its strength. Proudhon, in the book which he dated from the prison of the Conciergerie in July 1851 defied the reaction to proceed to its logical end. «*The Revolution,*» *he says,* «*is at the present moment so thoroughly consummated in the national thought that to pass from thought to action is but a matter for executive energy. It is too late to avoid its power. The Revolution wills to be, and for her to will to be is to will to reign.*» The Bonapartist *coup d'état* was the object of this peculiarly audacious expression, and it had the effect of raising the proletariat once more to a conquering height in politics. The same hope, the same ambition permeated the days which elapsed just before the fall of the second empire. Throughout 1868 and 1869 public meetings were the medium where the communist or the mutualist put forward the socialist doctrine with the utmost strength. The middle classes, especially the middle classes of the republican stamp, held aloof and affected to despite such programs as «utopias,» but in the midst of their disdain the revolutionary working men were planning to lay a hand upon the new régime which was so soon to appear. Among Blanqui's papers, notes have been found upon the rôle which the proletariat would presumably play in the Revolution which he saw to be imminent. Had not the war of 1870 cut into these plans and had not the empire fallen under the particular blow it would, without the slightest doubt, have fallen a few years later under the blows of a Revolution in which Socialism would have had a very large part. The attempts which were made during the siege of Paris by the Blanquistes on the 31 October, and which later developed into the Commune, would have dominated the new government or at least would have been very largely represented in it. There was even a moment when the republican part of France hesitated between the Commune and Versailles, and once again at that moment the French proletariat might have thought itself upon the eve of obtaining power.

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* All these works except the translations of Brissaud are edited in Paris.

It is evident that a working class with traditions of this sort and with an education of this sort is essentially political. It is evident that such a class will be acutely sensitive to political events, will be ready to watch them upon all occasions, and to seize every chance of penetrating into the very heart of the state and of there establishing its sovereignty.

Nevertheless a man might have asked himself after the Commune whether the socialist idea had not been buried. Superficial observers believed it to be dead, or at least laid for a long time. M. Taine expressed that thought clearly, standing with some friends before the wall where the prisoners had been shot in Père la Chaise: he said, «We are rid of Socialism for half a century,» and M. Thiers in his electoral manifesto of 1877, during the great struggle of the Republic against reaction which is known as the «Seise Mai,» boasted that he had finally crushed «the insane doctrines.» It is true to say, moreover, that Socialism then seemed doomed. The foremost of its fighters had been thrown down by the reactionary government of Versailles, they were transported or they were weary of the fight, or they were forced to fly the country. The people no longer so much as heard the distant voices of the exiles.

It must not be imagined on this account that the French proletariat, which had refused to give up hope or to cease a moment from its effort after the days of June 1848, had lost its ideal after 1871.

What had happened was that the working people of the country were now absorbed by another battle which though it was not fought in the streets was not less tragic than a civil war. This battle was the struggle between monarchy and republicanism. The French proletariat at this moment had the foresight to perceive that before it could raise the socialistic flag again the republican battle must be won, and therefore, under the appearance of a mere constitutional struggle, a class war arose which lasted until 1877. The point of the struggle was to determine whether France should be governed by an oligarchy drawn from the remains of the old régime, an oligarchy of which the Orleanist and clericalized middle class were the nucleus, or on the contrary by an artisan democracy. But this class war, embroiled and intricate as it was, did not suffice for the socialistic idea once it was thoroughly awake, and the proletariat was but waiting for the defeat of the counter revolution to bring forward the social question and to force it upon the victorious republican party. Just after the Republican elections in which the country replied in October 1877 to the challenge of the reactionaries, Guesde and his friends began their revolutionary and collectivist campaign in their newspaper *L'Egalité*. The moment marks a decisive date in French socialism.

The first number of this journal appeared on 1 Nov. 1877. The very greatest difficulty confronted the leaders of the movement. In the first place the resistance of Marshal MacMahon and of the survivors of the *coup d'état* had not yet ceased and the socialist party had to defend itself against the accusation which the Republicans brought against it of creating a diversion in the midst of the struggle. *L'Egalité* replied to these calumnies and to the treacherous insinuations which accompanied them by exactly defining its republicanism. It used the following words:

«The appearance of this journal in the midst of a political crisis does not arise from the fact that its founders are under any illusion as to the objections which would be made to them by the Republican party, objections of which the last speech of M. Jules Ferry has given us a foretaste. The moment in which we appear has been said by those who are too honest to calumniate us to be ill chosen. To this we reply that we have not chosen the moment. Week after week our first number has been put back in the hope that the will of the country as it was expressed on 13 October would have been put into full execution. It is not our fault if the delay in radical reform has been caused by the struggle between a small clique against the whole nation.

«We might further ask whether in the opinion of Republicans who blame us any moment whatever seemed well chosen for attacking the economic privileges of their class, and we defy them, if they are indeed sincere, to reply in any affirmative manner.

«The only men who have the right to attack us in the matter of our publication are the working men, whose organ we desire to be, and upon that side we are quite at our ease. The working class have too clear a conception of their interest not to understand that the moment just before a battle is the very moment when it is the most essential not to leave the liberal middle classes in any doubt as to the nature of the help which we are willing to give them against a common enemy. The moment before the battle is also the moment for proclaiming in the strongest manner that it is not the business of the working classes to be perpetually pulling the chestnuts out of the fire for professional politicians, but rather to clear the only ground upon which their claims can be successfully established. And that ground, of course, can only be a republican republic.»

Another formidable problem arose before the organizers of socialism at this time — that is 1877. What should be their attitude toward universal suffrage? Should they despise it or should they use it? Up to that date universal suffrage in France had always appeared as an instrument of reaction. It was under the heavy weight of the peasantry that the empire had crushed the republican and socialist thought of the towns. Hardly had that thought been relieved somewhat by the revolutionary forces of September and the fall of the empire than France was again given up by universal suffrage to the reaction, to the country squires and to the fanatical clericals of the assembly at Versailles. But universal suffrage was destined bit by bit to be enlightened and to emancipate itself. The republican idea alone had had the strength to liberate the country from the assembly at Versailles. Universal suffrage had (again through the republican idea) found the strength to break the counter revolutionary attempt on the 16 May 1877. To despise universl suffrage and not to take advantage of it would be to remain outside the national life. To have done so would have been to reduce the socialist to an anarchic and powerless sect. Guesde and his friends accomplished a decisive act and rendered the French proletariat a vast service when they decided to rely upon universal suffrage, for by this decision the proletariat entered into the main current of the national life. They did not expect democracy would of itself achieve the socialization of property. They believed that only revolutionary violence would succeed and that the proletarian revolution would have to be accomplished by force, as every other revolution had been accomplished, and as more recently in the United States had been accomplished the abolition of slavery. But by relying upon universal suffrage they changed the nature of the class struggle, they took it out of the workshop and brought it into the large world of politics. It was decided that the proletariat should choose men who would represent their class when they should send into Parliament men who had no idea of needing a majority there, but who could without ceasing act upon and render anxious the capitalist régime.

The plan was to cast upon that régime so implacable a light that in its exasperation and bewilderment a social revolution far more systematic and far more thought-out than the Commune should at last push capitalism to its last entrenchments and make it deliver a decisive battle. The resources of universal suffrage were for Guesde and his friends only the prelude to an active revolution. What might be called the historical ambition and the historical habit of mind of the French proletariat was awake. It thought itself now as ever on the eve of a final assault and believed that it might enter into the government of the state by some unguarded door, and in its turn become master where the other classes had reigned. From 1877 to 1893 this was the attitude of mind of the French socialists whether they were the friends of Guesde or Blanquists, whose leader Vaillant had been brought back from exile by the recent amnesty. In the same tone of thought were journalists who, like Allemane, represented the Parisian proletariat. The great electoral successes of 1893 which suddenly introduced into the Parliament a body of 40 socialists, brought this excitement to a head, and the more enthusiastic of the party were justified in believing that the proletariat had at last reached the goal of their effort. The Republican and the middle class parties, worn out by the long and continual struggles between the opportunists and the radicals and broken by the Panama scandals, seemed condemned to impotence. Guesde believed their régime to be in its death throes, and he thought that the moment had come to turn democracy away from what was now no more than a corpse. The socialistic minority needed nothing more than ability and courage in his opinion to become the leading majority, and universal suffrage would vote socialist if only an active and wide propaganda could be inaugurated among the peasantry and the smaller tradesmen, to prove to them that their personal interests lay in an alliance with the industrial proletariat.

It was at this moment that Guesde addressed to the bourgeois parties in the Chamber, the phrase: "We need use no weapon against you but those which you have provided for us in your own legal forms."

It will be seen that by this time the tactics founded in 1877 had changed. But the same hopes and the same courageous spirit of action permeated the socialist proletariat. These hopes undoubtedly contained an element of illusion, but they were not all illusion. The political efficacity of socialism was rapidly growing and although the results had not given the socialist proletariat the full victory for which it had hoped, it nevertheless kept the activity of the party and its general spirit alive. Even when, after 1898, the socialist party had to give up the hope of an immediate and final success, it none the less retained the knowledge that it had become an historical force of the first order and one capable of playing a decisive part in the national life. It is this result which, when one eliminates the details of the struggle, remains the chief fact in the participation of socialists in the defense of the Republic under the Waldeck-Rousseau ministry, and the participation which the party also took in the work of laïcal emancipation under the Combes ministry. The traditional thread which unites the action of the French proletariat is perpetually showing itself in new forms which arise for the momentary necessities of the Republican democracy and the Parliamentary régime. At the present moment the "parti socialiste uni" is withdrawing itself from the parliamentary system of groups and especially from those which aim at the forming of a ministry, but it is not so withdrawing itself in a sort of contemplative solitude, neither is it so withdrawing itself because it has given up hope of some ultimate decisive action. It is withdrawing itself because its leaders have discovered that the moment had come to rally to itself the general conscience of the whole working class and it could not do so without further propaganda. When that propaganda shall be completed, it will be able to throw all its forces into the general movement of politics without in the least abandoning its ideal. In the first great crisis whether interior or exterior that may shake the troubled modern life of France the Socialist party will throw itself into the centre of the struggle and it will be driven forward by the indomitable and compelling hope which its history has taught it.

So true is this that even those of the French proletariat who imagine themselves to be divorced from political action are, if their methods be closely watched, only seeking some new form of action which shall be more political. What is known in France as "La Syndacalisme," that is the Trade Union movement which pretends to stand aside and to be able to despise electoral and parliamentary action, is at bottom an essentially political thing. When the leaders of this movement put it forward that a general revolutionary strike may compel the world to a communistic form of production — to put forward such a theory is to inaugurate an action that is, at bottom, definitely political. It would be an error therefore to think that the newer movements in French socialism are an abandonment of the chief political method or a delaying of it. They are rather an emphatic assertion of it, an exaltation of that certitude in the political future which we have called the defining character of socialism in France.

This note of hope, however, which has been so frequently mentioned in this article would be but a sort of madness if French socialism were to count upon the industrial worker alone. For the industrial development of France, though in the last 50 years it has been accelerated, is relatively far less than that of England, Germany or the United States. France is still largely an agricultural country, and if socialism were to retain as enemies against itself the 19,000,000 of peasants, nay more, if it did not draw them in the wake of its ideas, it would break itself against an insurmountable obstacle. It is on this account that the party has attacked the problem of converting the peasant. The French socialists know very well that the millions of peasant proprietors will never allow themselves to be expropriated by law. The party has put forth all its efforts to persuade the small proprietors that no such agrarian communism is in view. The theoretical formulæ which have here arrested the development of German socialism have not weighed upon the French party. It is the opinion of the leaders of that party that the peasant proprietor will bit by bit enter voluntarily into a state organized upon the socialistic basis and this is the future that far-seeing men like Blanqui believed to be nearer than the event actually proved to be. It is this process of gradual and voluntary acceptation of the collectivist state by the peasant proprietors which Guesde foresaw in 1877 and put forward in his newspaper. «The French peasantry,» he wrote, «may rest assured that expropriation of their land would remain necessarily outside any programme for a collectivist organization of the great industries or of large landed property.» Blanqui also had laid it down as a doctrine of tactics in the admirable notes which he drew up at the end of the empire. He pointed out that the peasants of the country were permeated by revolutionary memories, that the peasants like the rest of the country had a tradition of hearty political initiative, that the peasants had given battle to the nobles and to the priests, and that the peasant had no love for the «fat bourgeois» who had taken the best of the lands. And socialism he thought based upon these traditions and these memories would end by attaching the peasant to its movement. In a word, one does not find in France any ineradicable conservative force nor any permanent trend of affairs which can oppose itself to the action of socialism.

It remains to add that French socialism, though perpetually attaching itself to party forms, can never permanently attach itself to such forms. It looks to a revolutionary and decisive achievement and bases itself upon a sort of national habit of revolutionary action. It is not to be imagined that this formula, however true, means that French socialism can in the future detach itself from the universal suffrage which governs the country, nor must it be imagined that it can develop its nature apart from the creed of democracy, which is part and parcel of the French people. But when one says that its character will remain essentially revolutionary and attached to the traditions of rapid political action one means that the French Socialist party will, like its predecessors, be perpetually and rapidly choosing from the mass of political events such a congeries as may be used for producing the maximum effect at the critical moment of a struggle, and that, like every other French party of the past, it will continue to reject compromise and to attempt nothing less than the full success of its clear and definite enterprise.

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9. SOCIALISM IN FRANCE DURING THE WAR. When the Great War broke out, the general elections had just taken place in France. The Organized Socialists obtained 1,200,000 votes (132 per 1,000), and sent 106 Deputies to the Chamber. The Republican Socialists had 23, the Independent Socialists about a dozen, the Radical Socialists about 150 Deputies, besides those groups dependent to a greater or lesser degree on Socialism, a certain number of Radicals, of Social Catholics even, amongst whom the most noteworthy was M. de Mun, accepted some of its claims. The Chambre de Deputes, a majority of which admitted the intervention of the state in economic matters, had on this subject a very different opinion from that of the Sénate where the doctrine of «Laissez-faire» predominated.

Among the different parties we must make a distinction between mere Reformers and the declared Radicals. Two only of these parties upheld the class struggle as a principle and called for a social revolution; the abolition of the salary and capitalist systems. These were the Organized party or French Socialist party, a section of the Workmen's International party, and the Syndicalist party, making up the «Confédération Générale du Travail,» known for short as C. G. T.

The Organized party labored chiefly in the political, the Syndicalist party in the economic, field. Seeking the same end but with very different men and means, they had maintained for several years rather strained relations which sometimes degenerated into open quarrels. The former aimed at the acquisition of power through electoral and parliamentary action; the latter meant to attain the same end by means of strikes and direct action and its keenest followers carried the policy of anti-militarism to the pitch of antipatriotism.

The Socialists were divided into groups, each member of which received yearly a card delivered to him upon payment of a subscription. The different groups of a same borough (commune) or, in Paris, of a same district (arrondissement) formed a *section;* and the different sections of a county (département) formed a *féderation* directed by a federal committee. The legislative power of the party was constituted by a yearly national congress, which met at different cities every year and whose members were chosen by the federation in the ratio of one member per 100 subscribers. The executive power devolved on a National Council, composed of delegates of the federation, of the parliamentary Socialist group and of the Permanent Administrative Commission, comprising 22 members, nominated by ballot at the Congress. The journal *Humanité* was the party organ and the *Socialiste* its official bulletin.

In France, in 1913, of 7,700,000 workmen and employees, there were only about 1,000,000 men and 100,000 women unionized, agricultural, mixed and employers' syndicates being deducted. They were grouped as follows: 5,046 local unions, 207 corporative federations of these, and 143 labor exchanges (Bourses du Travail). The legislative power of the confederation, which did not include all these organizations, was an annual congress held in different towns every year, and at which an executive committee was elected whose office it was to administer the affairs of the Confederation, with its seat in Paris and to name a secretary. The official organ of the Confederation was *La Voix du Peuple* and its newspaper *La Bataille Syndicaliste*. The two radical parties had ties with similar parties in foreign countries. International congresses discussed pressing questions of the moment and a permanent central organization furthered communications between the several national sections: The International Socialist Bureau had its seat at Brussels, its president was Mr. Vandervelde, its secretary-general, Mr. Huysmans; the International Syndicalist secretary's office had its seat in Berlin and its secretary was Mr. Legien.

The Effect of the War upon the Different Factions of French Socialism.— In every country, war in so far as it obliges the citizens to concentrate their forces in order to defend themselves is opposed to the policy of «Laissez-faire,» and, as it arouses the solidarity between members of a same nation, it demands that the general interest prevail over particular interest. It thus creates a semi-socialistic atmosphere; and it may be remarked that, in France, very many measures brought on by events were more or less tinged with socialism; thus the buying, selling and distributing of certain articles of food by the state or municipalities; requisition and taxation of other goods; grants of relief to the unemployed; proclamation of the principle that the reparation of the damages borne by the few is a social debt to be repaid by all; agricultural work performed jointly by all the inhabitants of the same village; collective tilling of neglected lands if the proprietor be defaulting; legal establishment of minimum salaries in munition factories and for home workers in the clothing trade; progressive income tax; the creation of employment bureaus and of mixed commissions in which employers and employees meet on an equal footing; and compulsory professional training, etc.

It happened also that numerous ministerial posts have been held by men who in their youth were influential members of the Socialist party, such as MM. Briand, Viviani, Millerand and Breton; or else who belonged to a group of Socialist reformers, such as MM. Augagneur, Painlevé, Godart and Métin. Doubtless Socialists who become ministers are not always Socialist ministers; nevertheless their presence in the Cabinet calmed to a great degree the fear and aversion which the middle-classes (*la bourgeoisie*) felt at the very name of Socialism.

But what it behooves us to follow is the life of the two radical parties which are the most active or the most strongly organized of all. To the very last, the Organized Socialists and Organized Radicals did all they could to prevent the huge catastrophe threatening the whole world. The former used all their influence with the government to maintain peace, the latter invited their foreign comrades to join them in the same cause. But their manifests, their appeals, their meetings woke no echo on the other side of the Rhine. Jaurès fell murdered, on 31 July 1914, after having taken steps for the maintenance of peace and having lost all hope of success. At his funeral, Organized Socialists and Organized Radicals, disappointed by the listlessness of the German Social Democracy, disgusted by the brutal violation of the neutrality of Belgium and Luxemburg, realizing that for France and the right of nations this was a question of life and death, proclaimed themselves ready to give their uttermost co-operation to the defense of the nation. They accepted the «Sacred Union» decree amidst general enthusiasm at the session of 4 Aug. 1914 of the Chamber of Deputies. They thus agreed to a two-fold rapprochement, and to a two-fold collaboration; first among themselves, second, with the Bourgeois parties. M. Jouhaux became a member of the National Relief Committee which comprised men of every opinion: Hervé, the fierce anti-militarist, preached war to excess in his organ *La Guerre Sociale* (later *La Victoire*).

On 28 Aug. 1914, in defiance of the policy which forbade members of the party to participate in a «bourgeois» ministry, MM. Guesde and Sembat were appointed to the Ministry of National Defense, in order, it was said, to prepare the general levy and to make certain that the country be told the truth. The former was named minister without portfolio, the latter Minister of Public Works; later on Mr. Albert Thomas was allowed to accept the undersecretaryship of Artillery and Munitions, which became in time the Ministry of Munitions. Soon a new organism arose; this was the Executive Committee (Comité d'action) constituted on 6 September, and comprised the Permanent Administrative Commission, the Socialists in Parliament, the directors and managers of *Humanité*, the delegates of the Federation of the Seine, representatives of the Confederation and of the Workmen's Co-operative Societies. It strove to impose a single directive head on the entire working class of France.

It has been active in relieving the wounded, the prisoners, the refugees, the soldiers belonging to the laboring class, in sending them newspapers, food, clothes, in finding work for the unemployed, in assisting the families of soldiers, getting information about the dead and the missing, in protecting them against the increased cost of living. It had spent, by the end of 1915, 82,840 francs ($16,568); by the end of 1916, 210,000 francs ($42,000).

In the meantime, the Socialist deputies urged the government to put a stop to the reactionary and clerical campaign and advocated bold fiscal policy in accordance with the needs of the times; they presented counter-projects on rents and taxes, asked that the monopolies of alcohol, insurance and hydraulic power should belong to the state, the abolition of the censorship, punishment for the speculations of the army contractors, etc. In the departmental and communal councils the Socialists elected advised the municipalization of public utilities; in the Mixed Departmental Commissions, in the Women's Labor Committee, the representatives of the workmen's syndicates discussed with the representatives of the employers' associations those problems created by the war or the solution of which was rendered urgent by it, as the organization of the labor market, alien workers, apprenticeship, terms offered to the men and women employed in the war factories.

All this may be called the outer life of both parties; their inner life was more complicated. It is a law of human nature, that in every group, however small, there should be a Right Centre (moderate conservatives), and a Left Centre (liberals). Unanimity is but an exception, a case of unstable equilibrium. Divergences of opinions and nature often aggravated by personal dislikes and jealousies soon make havoc of it. It is therefore not to be wondered at, if the war lasting beyond all forecasts, fissures showed and increased in the *bloc* constituted primarily by the political and economical labor groups. They still agree not to break up the International Congress a second time, that the right of peoples to dispose of themselves and to choose their nationality be one of the bases of the future peace, on the suppression of secret diplomacy, on the limitation of armaments, on compulsory arbitration to settle international conflicts, on the restoration of the independence of Belgium, Poland and of any country annexed by a larger state against its own free will. Let us add that no one has advised sabotage in the factories, nor desertion from the army, no one even proposed to carry to the trenches the discussions at home. But, apart from these, there are numerous points provoking dissension, many of them common to both the Organized Socialists and the Organized Radicals. Let us begin by these: (1) Who bears the responsibility of beginning the war? The majority agree that it rests with the Austro-German aggression. The minority, without denying this undeniable fact, are of opinion that the responsibility rests with all governments and capitalists who are always eager to conquer and annex. (2) The question of Alsace-Lorraine, ever the stumbling-block to a good understanding between France and Germany, appears to the majority as capable of solution only by the restitution to France of the territories wrenched from her by main force. Liebknecht and Bebel, in 1871, protested against this act of violence, say the majority; they do not say what the lot of the immigrants is to be; the minority think that the inhabitants should be consulted, but say nothing of those who left the country in order to escape German domination; a tribunal by arbitration, the composition of which is not made known, is to solve the question. (3) Is the common danger to put a temporary stop to the class struggle? Doubtless the necessity of defending the fatherland has for a time cast into the background this class struggle, which is one of the very foundations of the Marxist doctrine. It is evident, too, that in many minds a reaction has taken place, setting up the humanitarian and fraternal principles which were those of the French Socialists in 1848, the ideal of justice which Proudhon as well as Louis Blanc strove to realize and which Benoit Molon, Fournière and the *Revue Socialiste* have never ceased to defend. It is natural enough that M. Longuet, Marx's grandson, should be one of the chiefs of the minority whose Left Centre proclaims that the class struggle is «irreducible,» that sacred union is but a delusion, that it is high time to denounce it as it has never been properly observed by the reactionary parties. The majority, though confessing that it ought to be better applied, cry out: «France first! Let us begin by saving our invaded country. The strife between capital and labor can be taken up when the Germans are no more at Noyon.» Logically, the minority have asked the «control,» that is to say, the exclusion or resignation of those who in the press, as Hervé, or in the Cabinet, as Albert Thomas, have urged or practised an active and unbroken collaboration with the government of National Defense. But the discussion of these severe motions has been put off to calmer times. (4) Must war be pursued up to complete victory? The minority do not like to hear «German cruelty» mentioned, they protest against the expression «to see it through,» — they disapprove of a political and economical crushing of Germany. One of its chiefs urged England not to vote compulsory military service. They repeat and approve the words of the German deputy Haase: «There shall be neither victors nor vanquished.» They consider the destruction of Prussian militarism as a lure, for war has never killed war. They foretell that all Europe shall be ruined through exhaustion and they ask immediate peace negotiations. The majority is committed to the Allies victory and ask the government to hasten it by energetic measures; but, in order that this war may be the last, they believe that German imperialism must disappear and that the damages it has wrought should be retrieved at the cost of its upholders. (5) This brings us to the most ticklish question, which has raised most passion and anger: the renewal of international intercourse, or, to state it more correctly, of intercourse between the nations at war. Stating that both Frenchmen and Germans have voted at the election of the Pope and have worked in common in assemblies of bankers and merchants, the minority believe that the renewal of intercourse should be immediate and some of its members have acted accordingly. As early as November 1914 a conference was held at Copenhagen, to which were invited representatives of the different national sections; the confederation did not reply to the invitation. The organized party's answer was a refusal. This reflected the opinion of the majority. But the International Socialist Bureau was urged by the minority to call a regular session. It had been transferred from Brussels to The Hague, but the Secretary-General, Mr. Huysmans, was opposed to a session which, owing to the reciprocal feelings of the English, French and Belgians on the one side and of the Austro-Germans on the other, could only degenerate into a general fight and might compromise the very existence of the International Congress. Mr. Vanderwelde, the president of the executive commission, had seen his country too much plundéred, laid waste and outraged to be in any hurry to reach out his hand to former comrades who had perhaps been among the despoilers of Belgium and who, in any case, had raised no protest against the ferocious treatment inflicted upon his compatriots. Against these demands for a full session, the majority urged meetings to which only the Socialists of the Allied and neutral countries should be invited. At the meeting held in London (14 Feb. 1915) only delegates from Great Britain, Belgium, France and Russia were present and they decided unanimously to see the war through to complete victory. Then the Italian Marxist Socialists, who had remained obstinately hostile to the intervention of their country in the war, arranged with the Socialists of a neutral country, Switzerland, to call forth at Zimmerwald (5 Sept. 1915) another meeting to which the official parties of France and Germany were not invited. There were 35 delegates, among whom Mr. Merheim of the Metal Federation and M. Bourderon of the Cask Federation (*Fédération du Tonneau*), a member also of the 12th section of the Socialist Federation of the Seine. There they met German delegates and signed with them a manifest and a declaration warning the groups against the «so-called national defense» and nationalist socialism. The meeting appointed an international socialist committee to meet at Berne and take up the work which the bureau at The Hague had declined to do. At the Confederation meeting of 15 Aug. 1915, M. Bourderon's motion: «This war is not our war,» was beaten by 81 votes against 27, with 10 delegates not voting. At the National Congress of one French organized party (25–29 Dec. 1915) a resolution of this same Bourderon similar to that of Zimmerwald was disapproved by 2,736 votes to 76, with 102 delegates not voting. Then the majority, condemning all endeavors to create irregular international organizations, stated the conditions under which the renewal of intercourse with the Austro-Germans might take place: Disavowal of imperialism and a policy of conquest; recognition of the right of peoples to dispose of themselves; protest against the violations of international law, of neutralities guaranteed by Europe. If the Germans were willing, not only in words, but in deeds, to adopt these principles, it depended on them alone to shorten the delays after which intercourse with them might be renewed. The discussion, however, was far from being ended. It was resumed with heat. The fact that Karl Liebknecht had «liberated his conscience» by breaking from imperialist socialism, that the war was lagging, that physical and moral sufferings were increasing, enlarged the number of chances of those who wished for the return of peace and the ultra pacifists renewed their efforts.

A new meeting, organized again by Italian and Swiss Socialists, was held at Kienthal (24–30 April 1916) and 28 organizations were represented. There were 40 delegates, five on the German side (two women); on the French side, three members of the Chamber of Deputies, MM. Brizon, Alexandre Blanc and Ruffin-Dugens were present, without an official mandate and solely of their own volition. A new manifest was issued similar to that of Zimmerwald but its terms were more violent. It said in so many words that for the rich slackers the war meant but the death of others and that the «will of social revenges» should take the place of the struggle between the nations. The Socialist deputies were asked to vote against all military credits and taxes.

The National Council (*Conseil National*) meeting in Paris in August 1915 disavowed the «Pilgrims of Kienthal,» as they were called, by 1,904 votes, but then there were 19 nonvoters and besides the real 59 absentees, 972 fictitious absentees refused to vote. The minority, represented particularly by the Federation of Haute-Vienne, by that of the Isère and by several groups of the Federation of the Seine, without binding themselves to the opinions expressed at Kienthal and Zimmerwald, seceded from the majority. The latter added to the expressed conditions upon which international intercourse might be resumed, an inquiry to place the responsibilities concerning the origin of the war and guarantees capable of preventing its renewal and the acknowledgment of the right of lawful defense for the working classes of invaded countries. The invitation addressed to the government to proclaim its «war-ends» might be considered as a concession to the minority, as on this ground the majority and the minority might meet. The moral break among the organized Socialists did not, however, break up the party. At its National Congress, held in Paris 25–29 Dec. 1916, a declaration was decreed upon by 2,838 votes to 109 (20 delegates not voting). It adopted as a first principle the liberation of Belgium and Poland and, in less distinct terms, that of oppressed countries from Alsace down to the Balkan states. It requested the Entente Allies to wage war energetically and to state clearly their peace conditions, answering thus the very vague conditions of the Central Empires. (It is to be noted that the official answer sent by the Allied countries to the presidents of the United States and of the Swiss Confederation gave almost entire satisfaction to the desiderata of the Socialists). In order that peace might be a lasting one and that a Society of Nations might be constituted, the declaration demanded the existence in all countries of parliaments elected by universal suffrage and governments responsible to the people.

The party agreed also on the future economic reorganization of France. But on the renewal of international intercourse which the minority wanted first and immediate, on ministerial collaboration in national defense, on the vote of credits, the discussion was animated and the difference between the two opposed factions was only from 200 to 300 votes. In the permanent administrative commissions in which both factions are proportionally represented, the majority has 13 members, the minority 11. As for the majority, its last manifestation up to the moment of writing has been that of the Socialist group of the Chamber of Deputies, joyfully greeting Mr. Wilson's message to the American Senate (27 Jan. 1917), not because the President of the United States expresses therein the hope of «a peace without a victory,» but because he opposes all imperialist ambitions, wherever they come from, and wishes to see, as the Socialists do, the establishment of a fraternal society of nations.

At the meeting of the Confederation, which took place in December 1916, in spite of the very vivid criticisms of the minority against the majority, all agreed on a very general declaration stating that in the future peace must respect the independence, the territorial integrity, the political and economic freedom of all nations, small or great, and on an invitation to the government similar to that voted by the Socialists.

This having been said on the intestine strifes among the Socialists as well as among the trades-unions, a few words will suffice to indicate the questions peculiar to each of the groups.

The Confederation in its meeting of 1 May 1916, at which 94 organizations were represented, asked that the International Secretary's office be transferred from Berlin to a neutral country, to Geneva for instance, and approved the American Federation of Labor's initiative, proposing that an Inter-Syndicalist Conference should be held at the same time and in the same country as the future peace conference. It decided also to call a Conference of the Workers of the Allied countries, which met at Leeds in July 1916. There a temporary office for correspondence was created, to be located at Paris, M. Jouhaux becoming its secretary. There, also, was discussed the question of alien workers and of the means of organizing them in the different countries so that the interests of the workers (immigrants and native) might be equally respected. The meeting adopted also resolutions relative to the laboring classes to be inserted in the treatises of peace, including especially guarantees relating to the right of syndication, to migration, to social insurance, to the hours, hygiene and security of labor, to the control which international organizations can and must exercise over the working of agreements concluded to that effect by the different governments. If we examine the syndical activity in France, we see it was marked by numerous interventions in favor of workmen and workwomen, interventions which, in the beginning especially, were mostly conciliatory; for the strikes, being for the greater part actuated by a demand for an increase in salary, were comparatively not numerous (107 in 1915 concerning 7,281 persons against 1,073 in 1913 concerning 220,428 persons). In 1916 there were a greater number of conflicts, but for the most part they were easily settled.

The war has diminished or put an end to certain unions. Others, however, have increased and there has been a certain merging going on among them. Thus, the railway employees and workmen who formed several rival organizations have become united into one vast and powerful federation.

It only remains to tell of the inevitable falling off of membership in the Socialist party, which took place primarily in the number of its members, 60 per cent of whom are mobilized:

	Cards	Mobilization stamps
July, 1914	93,218	574,184
November, 1915	24,638	137,019
November, 1916	24,854	176,032

For the former it means an increase of 200 over the year 1915, for the latter an increase of 39,013, and the treasurer of the party states that the increase continued in 1917. In short, among Socialists and union workers an acute crisis of internationalism threatened the unity of the organized party and to a lesser degree that of the Confederation. But we can repeat the words of Mr. Charles Gide at the Conference of the Allied Co-operatives in September 1916: «We read daily in the press that internationalism is dying away. This is not true. Neither capitalist nor intellectual nor co-operative internationalism is dying off . . . .» And we can add: «Neither is that of the working class . . . .» It seems only as if Germany is to lose the direction of the movement which is thus to take a new character.

In the intellectual, political and economic life of France, there is *a very obvious penetration of ideas and dispositions of Socialist inspiration, in the wider meaning of the word,* which shall not be entirely temporary.

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10. CHURCH AND STATE IN FRANCE. At the outbreak of the Revolution of 1789, the Apostolic and Roman Catholic religion was the religion of the state, and, since the Revocation of the Edict of Nantes, no other religious sect, Christian or non-Christian, had had (except in Alsace) any legal existence in France. Nevertheless, a royal decree two years before had granted a sort of tolerance and legal status to the Protestants. The king had likewise allowed the Jews to live in certain cities in the kingdom, and there to carry on their worship in private: a régime of tolerance, not of freedom of conscience. The relations between the king and the Pope were determined by the concordat concluded in 1516 between Francis I and Leo X.

The men of the Revolution had no intention at first of secularizing the state or of separating it from the Church, nor even of establishing any real liberty of conscience. The Declaration of Rights of 1789 granted, in fact, only tolerance, and it was not until the 27 Sept. 1791 that the Constituent Assembly placed the Jews on a similar footing with other citizens. While it confiscated the possessions of the Church, it nevertheless tightened the bonds of Church and State by means of the law entitled the "Civil Constitution of the Clergy" (12 July 1790). This gave to the clergy a salary from the state, by which the parish priests especially profited, and this first budget of the religions rose to about 100,000,000 francs. As a consequence and climax of the Gallican policy of the kings, the Civil Constitution of the clergy tended to make the Catholic religion national. Thenceforth the bishops and the priests were elected by the people; the bishops no longer received from the Pope their canonical institution; it was given them by another bishop. The newly elected clergyman could not address to the Pope any request for confirmation; he had to confine himself to writing to him, as visible head of the universal Church, in testimony of unity of faith and communion. Thus without any diplomatic notification, the concordat of 1516 came to an end.

But the Catholic religion continued to be the religion of the state, and no salary was allotted to the ministers of other creeds; it was thought that enough was done for them in leaving them undisturbed. Such were the events which, little by little, led the Revolutionaries to loosen the bonds which united Church and State. The Pope, after much hesitation, condemned the Civil Constitution, and the clergy divided into two factions whose numerical proportions are not well known. Those who accepted the Civil Constitution and took the oath it demanded were called *Constitutionals*, or *Assermentés;* those who in obedience to the Pope refused the oath were called *Refractories.*

There were thus a Papal Catholic clergy and a non-Papal Catholic clergy whose partisans quarreled for the possession of the churches almost to the point of civil war. The inclinations of both parties alike were adverse to the liberty of sects; but most violent objection to such liberty was made by the Papal clergy, who had become an opposing minority. The Constituent Assembly with very ill grace finished by granting the principle of it by the law of 7 May 1791, which authorized the Papal party to carry on their worship in the churches in concurrence with the non-Papal party with reservations and irksome restrictions. This was to some extent a recognition and consecration of the existence of the schism, but the people, attached to the idea of religious unity, had no wish for any schism. Consequently, in one part of the country the Papal clergy, in another the non-Papals were harassed; and continual religious disturbances took place during the years 1791–92. It was the recognition of this situation which inclined many enlightened Frenchmen to the then very unpopular idea of the separation of Church and State and the secularization of the state.

Even the National Convention, which passes in history as an assembly of atheists, put aside at first, in November 1792, a project of separation, and formally maintained the Civil Constitution, limiting itself to making laws against refractory priests. But soon, when the Republic had replaced the Monarchy, all the Catholic clergy became unpopular. The patriots accused the Papal clergy of conspiring with outside enemies and with the *émigrés,* and also of fomenting the civil war in the province of la Vendée. They accused the non-Papal clergy of having taken part in the Civil War of the Republic with the Girondins against the party of the Mountain. It seemed to the people that all the priests, Constitutionals and Refractories, were conspiring against the Revolution, and that they were a permanent danger to the Republic. Although the people had not become philosophers, they had the feeling that to put it out of the power of the priests to harm the country, they would have to tear down their altars; and it was thus, much less by philosophy than by patriotism, much less by antireligious fanaticism than as an expedient of national defense; it was thus that there arose these popular disturbances which finished by taking the form of an attempt at the dechristianization of France. There was first the cult of Reason, with which the convention was associated only to a limited extent, principally in permitting the communes to renounce their worship. Through its Committee of Public Safety it strove to prevent violence against persons; it proclaimed the principle of liberty of conscience. But passions were stronger than the laws or the government. One after another most of the churches were closed and the observance of religious worship was pretty generally suspended in 1794.

A new attempt at a state religion was made the same year by the efforts of Robespierre, who was then the true head of the French government; this was the worship of the Supreme Being, a sort of philosophical religion or purified Christianity, which disappeared entirely, or almost so, when Robespierre died.

Then, when the victories of the French had put an end to the terror which the coalition of priests and foreigners had inspired, the Catholic religion spontaneously reappeared. Then at last, enlightened by experience, waiving all idea of a state religion, the National Convention established the secular régime of separation, which lasted from the end of 1794 to the spring of 1803. Under this régime the state paid no further salaries to any sect, and all the sects, equal before the law, worshipped freely, with the provisional restrictions and the police precautions rendered necessary by the state of foreign and even civil war in which France still labored. A number of the churches were restored to purposes of worship, on condition that the priests who should enjoy the privilege should submit to the laws. Nevertheless, there remained a shadow, a trace, of a state religion; this was the "*culte Decadaire*" or "Ten-Days" religion, a sort of official religion of patriotism, which disappeared little by little under public indifference, when the country was no longer in danger. On the other hand a new religion arose, a kind of unofficial continuation of the cult of the Supreme Being; this was Theophilanthropism.

Papal Catholics, non-Papal Catholics, Jews, Protestants, Theophilanthropists, adepts of the ten-day cult; all these sects acted as counterpoise to each other in a state of liberty, and although the vicissitudes of foreign and civil war brought on acts of intolerance, it may be said that the régime of separation of Church and State became a part of the life of France at the time of the Consulate, that it was at least endurable for all sects and that there was a rich development of religious life.

If Napoleon Bonaparte suppressed this régime of liberty, at which he had himself presided with as much success as talent; if he came at last to desire and to effect the reunion with Rome, to conclude a new concordat, it was not at all from piety but from personal ambition, his purpose being to command, through the Pope, the consciences of men, to realize through the Pope his dreams of power and of universal empire.

When the victory of Marengo had made him sufficiently popular to believe that all things were permitted to him, in the enforced silence of public opinion and the press, he entered upon negotiations with the Pope, and on 15 July 1801, at Paris, an act was signed which, since none dare call it a concordat, was called a Convention, but which was really an agreement analogous to that which Francis I had concluded with Leo X. In it Catholicism was not declared the religion of the state, but the fact was recognized that it was the faith of the great majority of the French people. The Pope was to demand or force the resignation of all the bishops then acting, and after a new circumscription of dioceses had been determined on, the First Consul was to make nominations to these bishoprics or archbishoprics and the Pope was to confer on the persons thus nominated canonical ordination according to the forms of the earlier concordat. The bishops should nominate the priests, but subject to the approval of the government. The Pope promised that the purchasers of property formerly belonging to the clergy should not be disturbed; and a suitable salary was to be given the bishops and priests by the government. On the other hand, the First Consul instituted some regulations of policy, called the Organic Articles, by which he received security from the churches, in conformity with the ancient Gallican policy. The Convention and the Organic Articles became law on the 18 Germinal, year 10 of the Republic (March 1802) and the new concordat was in force from the end of the following April.

The greatest advantage that accrued to the Pope from this document did not appear in writing: this was the suppression of schism. Bonaparte abolished the heretofore constitutional church. He abolished also Theophilanthropy and whatever remained of the "Ten-days" worship. Protestants and Jews were recognized and protected by the state, but not with the same degree of honor and influence. The Concordat promised salaries only to the district priests. When Bonaparte became emperor, he allowed a salary of other priests or curates to the number of more than 30,000. The budget of Religions swelled little by little. At the time of the rupture of the Concordat, in 1905, it was about 50,000,000 francs.

Pope Pius VII, who had signed the Concordat, came to Paris in person to consecrate the new emperor, but Napoleon did not find in him the docile tool he was counting upon. Not being able to bend him to every whim of his despotic will, he used force, had him carried off from Rome and kept him a prisoner at Fontainebleau, thus provoking the wrath of the Catholics and bringing upon himself the hatred of all religious persons.

It was in hatred of Napoleon, likewise, that Louis XVIII planned to make a new concordat more favorable to the Church. This concordat was, indeed, drawn up in 1817, but it was not carried out, and it was the Concordat of 1801 which governed the relations of the Catholic Church and the state up to the beginning of the 20th century. The charter of 1814, while guaranteeing the freedom of conscience, declared Catholicism as the state religion. This declaration was from the charter in 1830, and the government acted from 1815 to 1905 in the direction of a real liberty of the sects, at least of those recognized by the state: for no legal guarantee was granted to the founding of new sects. On the whole, although some of the liberal party from the time of Louis Philippe demanded a return to the régime of the separation, the regulations of the Concordat acted without encumbrance and seemed to suit the state of public opinion in France up to the end of the 19th century.

After the promulgation of the dogma of Infallibility, the Catholic Church, now an entirely absolute monarchy, appeared a menace to civil society; especially when the suppression of his temporal power had made the Pope invulnerable. On the other hand, since the loss of Alsace-Lorraine separated from France a large number of Lutherans, Catholicism had no longer any rivals but the Jews, who do no proselytizing; and the Calvinists, who do very little. In the years which followed the Franco-Prussian War, the Catholic clergy showed a desire to govern France and even to plunge her, all shattered as she was, into the perils of a war for the restoration of the Pope's temporal power. The same clergy favored the two attempts at political reaction by Marshal MacMahon. Thus the priesthood lost its popularity. Soon the primary schools, now a lay institution, enfeebled religious faith in France, and free-thought made great strides. Every year in the Chamber of Deputies, lively opposition was made on the vote on the budget of Religions, and the separation of Church and State was demanded in a considerable number of electoral programs; but there was, nevertheless, no strong popular movement in this direction. Even the Chamber elected in 1902 seemed determined to maintain the Concordat.

An unlooked-for incident changed the situation. In the spring of the year 1904 the President of the French Republic returned the visit which he had received from the King of Italy, and moreover returned it at Rome. The Pope, who still claims the sovereignty of his ancient states, declared himself insulted by this proceeding and addressed to all the Catholic Powers a document in which he complained of the offense committed by the French against his rights and his dignity. This memorandum, when made known, deeply wounded the national sentiment of the French. The government of the Republic recalled its Ambassador from Rome and returned to the Papal nuncio his passports. There was a complete rupture of diplomatic relations between France and the Pope, and on 10 Feb. 1905, the Chamber of Deputies, by a majority of 386 votes against 111, declared "that the attitude of the Vatican rendered necessary the separation of Church and State."

The writer of the project of a law of separation was M. Aristide Briand, Socialist Collectivist, a man of character more moderate than his opinions. He strove, by skilful combinations, to prepare a régime that would be acceptable to the Church, but there were no negotiations, official or direct, with the Pope himself. The Briand plan received, in the course of debate, but few amendments.

The whole bill was passed in the Chamber of Deputies on 3 July 1905, by 341 votes against 233, and in the Senate, on 6 Dec. 1905, by 179 votes against 103. The law was declared 9 Dec. 1905. It forms to-day the politico-religious system of France.

The particulars of the law are these: the republic assures liberty of conscience and guarantees the free observance of religious worship; it does not recognize nor pay nor subsidize any sect. All public religious establishments are suppressed, revenues, factories, councils of elders, consistories and the like. The property of these establishments will be transferred to associations called "cultuelles" to provide for the expenses, the maintenance and the public observance of a sect and composed of a minimum of 7, 15 or 25 persons, according to the population of the community. The church buildings which belong to the nation (and this means the greater number) will be left free of charge at the disposition of the religious societies, who will be held responsible for repairs of all sorts. Life pensions are granted to ministers of religion of more than 60 years of age and actually in service; those less than 60 years old will receive an allowance for four years. As to the police regulations of the sects, the meetings are public, but take place under the surveillance of the authorities in the interest of public order. Penalties are enacted against such ministers of religion as shall make in the churches any extreme political opposition to the Republic.

The Protestant and Jewish congregations submitted without difficulty to this law, but such was not the case with the Catholic Church, or rather with the head of this Church. The majority of French bishops, in assembly at Paris, agreed to accept the law, after a formal protest, and to organize, under the name of Canonical Associations, societies analogous to those the law recommended. There even seemed to be a sort of agreement established between the clergy and M. Briand, who had become Minister of Public Instruction and Religion, and who had charge in this capacity of the administration of the Law of Separation. Moreover, the most eminent of the Catholic laity, the Catholic "Intellectuals," had publicly advised the Pope to accept the law. The Pope preferred to follow the advice of the Jesuits, who urged him to an uncompromising resistance. He believed that the formation of religious societies would bring democracy into the Catholic Church in France, and from that the destruction of the monarchical hierarchy of the Church would some day result. Not only did he condemn the law but he forbade the formation of the religious societies or anything that resembled them. The French bishops were dismayed, but they obeyed the Pope.

There seemed reason to fear a religious civil war. Already at the beginning of the administration of the law, when the government wished to make an inventory of articles of furniture kept in the churches, the Catholics had forcibly opposed the officials in more than one place, and in some conflicts blood was shed.

This time the government pushed prudence to the point of negative passiveness. It allowed the Catholic priests to continue their services in the churches of which they already had possession, and to this day they keep this possession under provisional title with no legal right nor guarantee. There has not been any religious disturbance in any part of France since the Pope rejected the law. Some of the Catholic laity tried by a sort of schism to form religious associations in defiance of the Pope's orders; their attempt fell flat, in the face of public indifference.

But the decision of Pius X deprived the Catholics of property whose transmission to the religious societies was assured by law, that is to say, the property of the former establishments of the sect, whose sum total is reckoned at about 300,000,000 francs. The Catholics thus saw themselves defrauded of the resources they would have found in the assessments, collections and contributions of the religious associations. It was difficult for them to pay their clergy and difficult to recruit them. Furthermore, the Pope had the advantage of being able to name the bishops without the permission of the French government, a privilege which gave him the opportunity to strengthen his absolute power.

The Great War in which France has been engaged since August 1914 has resulted in a truce being called to religious controversies and has almost completely obliterated their remembrance. Clericalism and anti-clericalism are words now scarcely ever spoken. On the various committees formed in aid of the national defense, free-thinkers and bishops sit side by side. There has not been in France any anti-papal movement. The war occupied all parties, and to-day all are united in a "Sacred Union." See CHURCH AND STATE.

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11. THE SEPARATION OF CHURCH AND STATE IN FRANCE. The Facts and the Law.— Without entering into an abstract discussion of right and wrong, we may admit as a fact that the whole world is now moving, more or less slowly, from the region where civil and religious power is lodged most fully in the same hands to the region where these two powers are completely separate; and to American minds, in the habit of taking practical views of things nothing must seem more natural and more profitable to the state as well as to the Church. How did it happen that, in France the same phenomenon could not be effected without great difficulties which nearly led the faithful to revolt and the state to persecution? A first cause of it is to be deducted indeed from the general centralization, from the moral impossibility of any great social force having a normal life outside of government control in a land where the state intervenes as master or guide in the most trivial details of the citizen's private life. But, in order to understand it fully, we have also to remember that for many hundred years Church and State had lived in union, and held their interests in common. After their intimate (though not always happy) relations during the Middle Ages, they had been united since the 16th century by the close bonds of a Concordat made between Francis I and the Holy See.

The French revolutionists did not at first seek to disestablish the Church, and if it is true that the Assemblée Constituante began by transferring to the nation all the property of the clergy, it was by agreement with the latter and under a formal pledge to provide for their support in an annual budget. So far from considering the Church and the State as separate and independent, the Assembly voted a so-called Civil Constitution for the clergy and intended to organize it in such a way that it would depend much more on the popular elections than on the authority of the bishops and of the Pope. It is well known that they achieved exactly the contrary of what they intended, and, instead of becoming thereby more closely united, the civil and religious powers were thrown into a violent conflict which led to their first separation. The Pope having pronounced the Constitution Civil du Clergé incompatible with the principles of Catholicism and the majority of bishops and priests having refused to sever with Rome, the Assembly proclaimed them rebellious (Refractaires) and endeavored to replace them by more docile ministers (prêtres assermentés), whom most of the faithful refused to follow.

Irritated by this failure, the government took more and more drastic measures against the Refractaires; and under the Convention, went as far as condemning many of them to exile and even to death. Such strained conditions could not and did not last; but the amelioration which followed covered a feeling of uneasiness and uncertainty equally detrimental to religion and public welfare. Therefore when, in 1801, a Concordat was signed between Napoleon and the Pope, giving the Church a legal status and regulating its relations with the state, France welcomed it with sincere comfort and satisfaction.

Despite its imperfections, the chief of which was the narrow-minded confusion of temporal and spiritual power, one must render the Concordat this justice, that it granted France almost a whole century of religious tranquillity. The conflicts, more or less grave, which sprang up from time to time between the state and the Church were as a rule only verbal recriminations, and always ended without serious consequences. At least such was the case under the Monarchy and the Empire, but under the third Republic after a few years of perfect harmony, feuds arose, little by little, which ever became more serious and finally brought about the very unfriendly rupture.

Our aim is to expose the events and laws of this last period with the errors or the faults which, perhaps from each side, have led up to the separation.

1. From its origin in 1871 up to 1876 the Republic showed itself extremely favorable to religion. The National Assembly, elected after the war, asked for the re-establishment in the Church service of the official prayers for the state, which had been temporarily suppressed, and for the restoration of the military chaplains. It admitted ministers of religion into the boards of Public Instruction and Public Charity. It increased by $800,000 the parliamentary appropriation for public worship. Finally in 1875 it gave private citizens the right, previously reserved to the state, to undertake higher education, a right of which the Church availed herself to found five universities. Need I recall that on the other hand, it healed up the wounds of the stricken fatherland with a rapidity which was the wonder of the world, and replaced France in a very short time in the position of dignity and honor from which the cruel disasters of the Franco-German War had for the moment displaced her? One of the most clear-sighted citizens of America, Father Hecker (q.v.), founder of the Paulists, who lived much in France at that time, declared the Republic of that day one of the best governments that any people had ever known.

Unfortunately the foresight of the men who composed this government was not equal to their honesty; and their ability to serve well the interests of the country at the time was the measure of their inability to follow its political and social evolution. The majority of them did not suspect that France, consciously or unconsciously, had entered the age of democracy; and when, after vain efforts to agree upon the choice of a king or of an emperor, they finally adopted, in 1875, a Republican form of government, because it was the only possible one, they lost the benefit of that act of wisdom in letting it be seen that they had done as they did in spite of themselves, and in setting themselves immediately to work to destroy what they had built up.

Those senseless tactics constituted at once the joy and the success of their adversaries, but I am frank in saying that France suffered grievously from it all. Men, if not gifted with the most profound foresight, at least possessed of honesty and disinterestedness, have been placed in a powerless opposition to the government, and from the special point of view which now concerns us this has been most disastrous for the cause of religion. The Conservatives, be it said to their praise, were in general the best friends of the Church, whilst by an unhappy coincidence the most active and advanced Republicans were at the same time enemies of the Christian faith. From this there resulted an inevitable solidarity, which on the one hand cast the lot of the Church with that of the Conservative party, and on the other hand identified the Republic with the cause of irreligion.

Little by little, however, a new generation grew up, and among the members of the Church were many who discerned the signs of the time and the political evolution of the majority of their countrymen. The liberal language of Pope Leo XIII and of Cardinal Lavigerie, advising Catholics to sincerely accept the republican constitution even when it was a duty to oppose some tendencies of the party in power, found enthusiastic echo in the hearts of many young priests and young laymen as well; and they did their best to destroy the old prejudice that Catholic faith was incompatible with republicanism, one of their chief arguments to prove that freedom and religion can find their highest expression under a republican form of government being America herself and the satisfaction with which American prelates view the conditions of the Church in their country.

Unfortunately this movement, called in France *Ralliement*, was not universal, at least before the Great War, and there remained some people simple enough to keep on believing that the acts of the government were an unavoidable fruit of republicanism, and that the only thing to do was to try to overthrow it. That little coterie of blind men of the extreme Right did not exert a real influence on public opinion, nor on the life of the country; but in their speeches and in their newspapers they gave a perpetual pretext to the Anti-clericals of the extreme Left to unceasingly assume the rôle of saviors of the Republic and to proclaim that, outside of themselves, there were no sincere Republicans in France. The Radicals, only too glad of such an opportunity, repudiated and misrepresented the attitude of the Catholics who were sincerely adhering to Republicanism and did their utmost to perpetuate the animosity between the Church and the state and to prevent a reconciliation which would have hindered them from monopolizing the benefits of power.

Hence the Radicals' perpetual hostility and their destructive measures against every religious institution, which we have now to speak about as impartially as we have pointed out the political mistakes of the Conservatives.

They declared war on the Church and that officially, when Gambetta put forth in 1876 his famous phrase "*Le cléricalisme, voilà l'ennemi*" ("Clericalism is the enemy").

As soon as they were assured of victory over the Conservatives, about 1879, they entered upon an active campaign against the Church and, having thus provoked her legitimate protest, pretended to see in this protest an attempt at revolt, and justified themselves in taking other steps more and more drastic against her, ending in laws of expulsion and confiscation which it is no exaggeration to regard as persecution.

At first they excluded the clergy from the Boards of Public Instruction where they had seats; they sought to degrade the higher education of the Church by taking away from the Catholic faculties the name of "Universities." Then Jules Ferry, Minister of Public Instruction, proposed a law, article 7 of which prohibited all teaching by members of unauthorized congregations. This article, which passed the Chamber of Deputies, was rejected by the Senate, thanks especially to the energetic opposition of that liberal philosopher, Jules Simon. The Cabinet however did not regard itself beaten, and lacking a new law such as they sought, they pretended to find support for what they proposed in some laws of the old monarchy. By the decrees of 29 March 1880, it was decided (1) that the Jesuits must vacate their dwelling-houses within three months, and their school houses within five months; (2) that all unauthorized congregations must procure an authorization within three months. The Jesuits remained passive and were violently expelled by armed forces on 30 June 1880; the remaining unauthorized congregations decided to take their stand with the Jesuits and did not ask for authorization. Notwithstanding that, the government did not dare to strike them all and it dispersed at that time only 216 religious communities. In spite of some eloquent protests and manifestations, the people were indifferent, and at the legislative elections of the following year (1881) the Left gained 50 additional seats.

Encouraged by that success, the Anti-clericals enacted in 1882 what they called the law neutralizing primary instruction, concealing under that apparently innocent formula sundry designs which since then have manifested themselves more and more clearly. Every religious idea has been excluded from the schools with the same care as contagious diseases. The authorities do not admit either as books for study or as prizes any works in which the name of God is found. They even exclude all poems which contain it. They blot it out in sentences from classic authors which they are obliged to retain in the curriculum. Still, we should be fortunate if all the teachers confined themselves to this system of silence, bad enough though it be; but many of them have spoken openly against God and railed at the doctrines of Christianity before their pupils. There are no religious schools in some places, and even where there are, all parents who have any connection direct or indirect with the government (and that means pretty nearly half the people) are obliged to send their children to these atheistic schools. In 1886 it was enacted that all public school teachers should be laymen, and later Catholics were forbidden to employ any members of the religious orders even in the schools entirely supported by themselves.

These measures for driving religious ideas out of the common schools are usually referred to as laicisation; but under the same name, many similar steps were taken in all the spheres of national life. For instance in 1880, military chaplains were dispensed with in time of peace, and in 1882 the chaplains at the normal schools met the same fate; in that year also the name of God was removed from the judicial oath; in 1883 administration of diocesan property, during the vacancy of a see, was confided to civil commissioners; in 1886 was suppressed, in the Budget of the Church, everything that had been added to it, even the most necessary things, since the Concordat; and it was decided that theological students and priests should perform military service. Add to this that almost all functionaries who were practical Catholics have been driven out of public office and that the remaining representatives of public power studiously affect to totally ignore religion, so that not once in 40 years has the name of God been found in any public document, in any discourse or any letter of either the President or the ministers or any other official.

A certain lull prevailed, however, during the last 10 years of the 19th century. Doubtless the anti-religious laws and decrees of which we spoke above were still being enforced, and a law was added to them in 1892, which obliged the vestries or parish boards of trustees to submit their accounts to be audited by the state, and another one in 1895 which imposed upon the religious congregations a special and exceptional tax, obliging them to pay on what was claimed by the government to be inheritances from their deceased members. But whatever malevolence inspired these two measures, they did not constitute any serious evil, and it may be said in general that this period saw the polemics become rather milder, the appeals for reconciliation more numerous and more eloquent. And to the voice of Pope Leo XIII, who was in favor of the acceptance of the Republic, was added, on the side of the government, the voice of Spuller, Minister of Public Worship, proclaiming the necessity of a new spirit; and even a Prime Minister, Jules Mélines, declared "it was not the function of government to molest a part of the citizens on account of religious convictions."

That was, alas, only a little rift in the clouds, a momentary clearing up in a stormy sky; and instead of a new spirit in place of the spirit of peace, there sprang up almost suddenly a tempest more violent than ever. All the world is aware of the occasion or the pretext for it, namely, the Dreyfus case. Even if people question the innocence of Captain Dreyfus, they cannot question the illegalities of his trial, and the great number of honest men in France who, blinded by party spirit, opposed for a long time the necessary revision of his sentence, compromised greatly the sacred cause of patriotism and religion of which they held themselves up as defenders. But the injustice of which one person was the victim and which has finally been atoned for to the honor of our national conscience does not at all render legitimate the acts of injustice which since then have been committed, under pretext of vengeance, against thousands of other persons, members of the religious orders and especially of the orders of women of whom the majority knew nothing whatever of the "affair" or of politics of any kind.

Let me add that there had been always a certain number of eminent Catholics who fought earnestly in favor of Dreyfus, and notorious enemies of the Church who were his adversaries to the end. Moreover it is right and of the first importance to point out that, if many Catholics were mistaken in that affair, as were so many other Frenchmen, they acted as individuals and in their personal capacity; nobody can point to a single act, a single word, of any ecclesiastical authority advising them to take the unhappy steps they did. But whatever one may think of the "Affaire Dreyfus" there can be no doubt that it inflamed passions, political, social and religious, to an unprecedented degree, and that it has been the direct cause of the difficulties or rather hostilities which we have now to narrate.

I will not enlarge upon the action of the Prime Minister Waldeck Rousseau in consequence of which the courts, in January 1900, dissolved the Order of the Assumptionists against which, as against the Jesuits, the friends of Dreyfus were especially irritated. That particular measure was soon lost sight of in a general act which reached in its effects almost all the religious orders of men and women in France; the law which the same minister had passed against them in 1901.

According to this law, religious associations cannot be formed "without authorization given by a law determining the conditions under which they operate," and supposing that they have obtained such authorization, they cannot found any new establishment except by virtue of a decree given in the Council of State. But there is something more. These establishments, after all those authorizations, are always at the mercy of the Executive.

The text of the law here merits attention. "The dissolution of a congregation, or the closing of any establishment, may be pronounced by decree given in the Council of Ministers." And this suppression, or the refusal of authorization, is very effective: every member of an illegal association is liable to a fine of upwards of 5,000 francs and to be sent to prison for a period of one year.

The same penalties may be exacted from any person who lets a room, a hall or a workshop to any member of a congregation; and these penalties may be doubled in the case of a founder or director.

But what steps must a congregation take in order to obtain proper authorization? It must previously submit to and even afterward hold at the disposal of public officers an exact account of its income and expenses, an exact statement of the value of all its property, whether personal or real, the name, age, occupation, past and present, of each of its members, with a complete record of his history. If notwithstanding this, authorization is refused, then they are "dissolved by the very fact, and the liquidation of their property take place by public process."

Now, the text of this law, severe enough in itself, was enforced by the Combes cabinet with so much rigor, and I may say so much illegality, that its principal author, M. Waldeck Rousseau himself, was obliged, on two occasions, in June and in November 1903, to declare in the Senate that the law had been completely warped by his successor; he gave battle to the Combes ministry exactly on this point and was defeated by a majority of 11 votes. The authorization was refused *en masse* to all congregations except five small ones whose destiny remained undecided, and this without any examination and in such fashion that the names of the greater number of them were not even mentioned in the single debate on the subject. Some congregations, notably the Jesuits and Assumptionists and others like them, seeing that the government was setting a trap for them, had preferred to disband of their own will, and so escaped, to a great extent, from administrative vexations and confiscations. The other congregations which, on the advice of the Pope, of the majority of the bishops and of the most liberal laymen, had submitted to the law, now declared their membership and their possessions to be in a far worse predicament than those who did not submit, for they were unable to save a single one of their houses or property of any kind, or even to preserve the individual freedom of their members, whose names had been given voluntarily in the request for authorization. One single provision of the law remains in abeyance: that which reserved to the members of orders pensions on their properties. This property was sold by the government at ridiculously low prices, because honorable men would not buy it, and the money realized on the sale has been swallowed up by the expenses, which had to be supplemented by advances from the government. The pretended billion of francs of the congregations has, therefore, melted away in legal expenses; and the members of the congregations were left to die of hunger, or to emigrate to free countries.

As a matter of fact most of them went into exile and remained there until 1914. When the war broke out, all those who were of military age returned to France ready to defend their country.

When one of two contracting parties thus treats the other, a rupture is morally certain and a trifle will suffice to precipitate it. But something remains to be said of three incidents which aggravated the situation and served as a pretext for the inevitable conclusion of these quarrels, namely, the divorce of the ill-mated union which the Church in France and the state had formed.

According to Article 5 of the Concordat "the nomination to the bishoprics should rest with the Chief Council and canonical institution should be administered by the Holy See."

It appears as if this article, properly interpreted, safeguarded the rights of the two powers. The government presented candidates to the Pope; their qualifications were considered and discussed, if there was occasion to do so; and when an agreement was reached between the two powers, their names appeared in the official journal of France. Afterward the Pope conferred spiritual authority upon the candidates, who were so nominated. Nothing on the face of it could be simpler than this. Some difficulties having arisen about the Latin translation of the word nomination in the official letter instituting the bishops, Pope Pius X yielded and altered the letters according to the requirements of M. Combes. But the Minister was not content with that victory. He declared that in future the candidates chosen as bishops by the government would be nominated in the official journal without waiting to inquire whether the Holy See would accept them or not. The consequence was that priests worthy of the honor refused to be nominated under these conditions, which were without doubt contrary to the spirit of the Concordat, and it came to pass that 15 dioceses were deprived of bishops.

The second incident was of a quite different order. Even if the Holy See itself appears to regard as impossible the restoration of the temporal power, it does not wish to recognize by any formal act of renunciation the spoliation which it suffered in 1870, and it requires that the heads of Catholic countries do not come officially to Rome and thus apparently condone such spoliation. All Catholic sovereigns have thus far conformed to that desire. The French government did not deem it its duty to conform to the demand; and having received in Paris in October 1903, a visit from the Italian sovereigns, it was thought that courtesy and the interests of France demanded that the President return that visit in Rome, and M. Loubet was sent there for that purpose in April 1904. At the end of the same month a confidential protest was sent by Cardinal Merry del Val, Papal Secretary of State, to all the powers with which he was in diplomatic relations, to the effect that the official coming of the French President to Rome was a grave offense against the right and dignity of the Holy See.

As long as the protest remained secret, nothing resulted from this platonic document; but about a month after its issue, a Socialist newspaper published a copy of it, and the storm burst. The newspapers friendly to the government declared that France had been grossly insulted, and the Cabinet of M. Combes ordered the immediate recall of the French Ambassador at the Vatican.

The Papal nuncio, however, still remained in Paris, and a secretary was left in the French embassy at Rome. The relations were not therefore entirely broken. The affair of the bishops of Dijon and Laval served to cut the last remaining knot. Those two prelates had long before been denounced to Rome as utterly unfit to govern dioceses. It is very difficult to know the truth of the matter, for political passions were much excited against them. At any rate, the important question was not that of knowing whether they were innocent or guilty, but whether the Pope could, according to the Concordat, compel their resignation without prior agreement with the French government. The Cabinet maintained that the bishops, having been nominated by mutual consent, could only be deposed by mutual consent. Pius X did not directly oppose this principle, since he requested their resignation instead of issuing an order for their deposition. While they were trying to escape a decision, he ordered them to come to Rome under penalty of suspension from their spiritual powers. The Minister, on his side, forbade them to leave France and sent an ultimatum to Rome to require the withdrawal of its last orders and threats. Cardinal Merry del Val replied by conciliatory explanations, but maintained, in principle, the right of the Pope to deprive unworthy bishops of spiritual power. Without any more discussion, the Minister telegraphed to the French chargé-d'affaires to notify the Vatican that "the government of the Republic had decided to put an end to the official relations which, by the will of the Holy See, had become superfluous." This notice was handed in without delay, and on 30 July 1904, the chargé-d'affaires of France left Rome, while the nuncio received orders from the Pope to quit Paris. And thus sadly ended the relations which had lasted for 14 centuries between France and the Holy See.

II

The French government which had only pushed matters to this extremity in order to bring about the suppression of the Concordat did not wait long before it sought to have this carried into effect.

The diplomatic rupture took place at the end of July 1904; at the next session of Parliament, in the autumn of the same year, M. Combes proposed to the Chamber of Deputies a project of law on the separation of Church and State. A commission was immediately nominated with M. Buisson as president and M. Briand as secretary, and the discussion commenced in the spring of 1905. On 3 July 1905, the Chamber passed the law; the Senate continued the discussion at its autumn session and passed it also, without changing a single word. On 11 Dec. 1905, it was promulgated and declared to be in force after one year.

Before commenting rapidly upon this law, a remark of historical order is quite necessary, namely, that the law which had passed, whatever may be thought of it, is on the whole less evil than the plans at first submitted to Parliament. For this reason and owing to the circumstances which had brought it about in a real spirit of hostility to the Church and to the comments of the Anti-clerical press which looked upon it as as a herald of the approaching suppression of all religion to the Catholics, it appeared generally even more belligerent than it was, and they were disposed to condemn it more severely than it deserved.

To judge it impartially with its characteristic good and bad and to put some sort of order in our examination, let us seek to understand, on the one hand, what the Church itself may consider advantageous in it and, on the other, what has given rise to her complaints.

There are effectively in the separation law several regrettable proposals, which we will explain later; but it affords one advantage and that advantage is so great that it appears to many people a compensation in itself for all its defects and dangers.

That advantage is the full liberty which is given to the Church to nominate her ministers without interference on the part of the state—a freedom of which she was deprived in France for more than four centuries. Undoubtedly the canonical institution of bishops was left to the Sovereign Pontiff, because that is considered in the Catholic Church an essential principle, an inalienable right; but their nomination, both under the Concordat of Francis I and under that of Napoleon, was left to the head of the state. And this was, between the two powers, a constant source of difficulty.

Whenever for one reason or another, they were on bad terms, they did not agree on candidates and numerous dioceses were left vacant. Let me add that this independence of the Church in the selection of bishops has its complement in the liberty permitted to them by the new law to assemble whenever they like, whereas the Concordat prohibited them from meeting and acting together even by letter in any collection, action or declaration.

The separation law interferes no more in the choice of parish priests than in that of bishops. The Concordat was not so liberal: "The bishops shall have the appointment of the parish priests," said Article 10 of the Concordat. But it added immediately "Their choice shall not fall but on persons approved by the government." One can realize the serious nature of such a restriction, and what conditions had to be fulfilled, for example, during the last 20 years in order to be agreeable to a Radical Cabinet. In most cases, to tell the truth, it was morally impossible for bishops to nominate for important functions the priests whom they considered best able to fulfil them. The satisfaction which they now feel in governing their dioceses freely is so great in spite of the enormous material difficulties that it enables them to bear the injustice and the vexation which the law of 1905 imposes and which we have now to consider, looking at the other side of the picture.

The first injustice which afflicted the Vatican and which had not been sufficiently emphasized, but which perhaps wounded it more than all the rest, was that the government abrogated, without consulting it, a bilateral contract in which its signature was, after all, on the same footing as that of the other party. The Concordat was a treaty between the Head of the French state and the Head of the Church. That the former, because it is the stronger, should abrogate it without informing the other party of the abrogation because it is the weaker is a sort of procedure not recognized by international law.

The state, moreover, took no more notice of the Church in establishing the new order of things than in doing away with the old.

It affected to ignore the Church and legislated without at all concerning itself with her, exposing itself, in consequence, to that which happened, namely, to have the Church reject the work which the government had done, and destroy it entirely by pronouncing calmly its *non possumus.* But did the state, whilst disposing alone of Church rights and property, act with justice and equity? Here in effect is what the law purposes:

First the budget of worship is suppressed (Article 2). Now the budget was not entirely a favor dependent on the Concordat. It was morally, if not legally, bound by the obligation recognized by France in 1790, when the Church freely ceded all its property to the nation on the condition, solemnly accepted by the latter, that out of the revenues of that property a suitable compensation should be granted to the clergy. It is to the honor of the Church that she did not insist upon that point in the discussion, but there was, in fact, an injustice, an offensive repudiation of a national debt.

But the state not merely gives nothing to the Church, it takes away from it, by Article 5, even the pious foundations anterior to the Concordat. It takes away from it, by Article 7, "the property real or personal affected with a charitable use or any other interest foreign to religious worship," that is to say that everything that has been given to the Church for purposes of charity or education will pass out of its possession into other hands, although the donors have specified that use in their gifts, and although every one of these gifts was approved, at the time it was made, by the Council of State.

Can you conceive of the Church being prohibited to engage in works of charity and education? Isn't that sort of thing the natural sequence of religious action? Can you imagine that the intentions of the donors should be absolutely ignored?

Article 12 denies to the Church any right of property in church buildings: "Building which serve for purpose of public worship or for the residence of ministers (cathedrals, churches, chapels, temples, synagogues, houses of archbishops and bishops, presbyteries, seminaries) with the outbuildings, pertaining to them, and the furniture and objects therein contained at the time the said edifices were reconveyed for religious use, are and remain the property of the state, of the Department and of the Communes." It is true that by Article 13 "buildings used for purposes of public worship with their furniture and equipment shall be put free of charge at the disposal of public religious establishments and thereafter to the associations summoned to succeed them," but by the same article: "the cessation of this right of use and, if occasion arises, its transfer shall be pronounced by decree, without right of appeal, by the Council of State in its judicial capacity." Notice also in the last words of Article 13, that, in spite of this precarious enjoyment of the mere use of property, the Associations "shall be held responsible for repairs of all kinds as well as for the cost of insurance and other charges pertaining to the buildings and to the furniture and equipment." For other buildings, it is even simpler. According to Article 14: houses of archbishops and bishops, presbyteries, and their appurtenances, the Catholic theological seminaries, and faculties of Protestant theology were to be all confiscated in any case after five years.

It is necessary to consider also that there was a possible confiscation threatening the Church in the future and which appeared to her authorities still less acceptable than the rest. Even if the Church had formed the religious associations to receive such church property as the law left to her, the title to that property could always be contested by a rival association usurping the same name, and, in case of a contest, the civil power in the person of the Council of State, was alone to decide, which of the two contestants was the legitimate heir of the property. The Liberals tried in vain to introduce by amendment of the Article one clear and assuring word, but they did not succeed in securing recognition of the bishops as in the Mexican law, nor of any governing body as is usual in the practical decision of the American courts. From the Catholic point of view, in which the hierarchy holds the first place, this fact made the law very difficult to accept, because, as M. Clemenceau himself wrote in his newspaper *L'Aurore*, "from an *association cultuelle* thus vaguely defined, there is only one step to schism."

Thus the law involved the spoliation of half the Church property and the insecure possession of the other half. There must be added to all this a number of annoying provisions, which perhaps do not really amount to much but which are scarcely compatible with a real separation. Thus Articles 5 and 22 oblige the Church to invest its funds in state securities which would be very susceptible of attachment. This referred especially to the proceeds of any property the Church might sell. Articles 22 and 21 limit narrowly the disposable resources of the Church and provide for a detailed audit of its receipts, of its expenses and of all its accounts by financial agents of the state. Articles 34 and 35 deprive priests of the right of recourse to the ordinary courts of justice and subject them, exceptionally, to judges named by the state, in cases where other citizens have the benefit of trial by jury. Finally, Article 36 makes the entire association responsible for any fine imposed upon its priest, even though he spoke or acted without their knowledge or consent.

Are these the fair conditions of an honest separation and have not we a right to see in them only the semblance of separation, a complete wiping out of every obligation of the state toward the Church, a perpetuation and in many cases an increase of the burdens and responsibilities of the Church toward the state?

Never was there seen a more perfect exemplification of M. Clemenceau's very original rendering of that text in the Gospel which says: "Render unto Cæsar the things that are Cæsar's . . . and everything is Cæsar's."

After all that and especially if we had the time to go into the details of the threats which the Radicals made at the time, especially in the annual Masonic convention, not to limit themselves to the measures provided for by the law of 1905, but to go on and do worse, to continue their war on the Church until they should abolish it, it would perhaps seem less difficult to explain the conduct of the Pope and the Catholics who refused to recognize the law in any way, than to explain the conduct of those (a majority of the bishops, a minority of the priests and of the laymen) who before the decision of Rome wrote and spoke in favor of conciliation, that is to say, practically advised forming *associations cultuelles.* It would be a great mistake, however, to suppose that they approved the law and thought it good in itself. Such was not their opinion; far from it. They merely thought that it was better at first to submit to that law and then to work energetically for its amelioration. They anticipated that, if it were rejected, they would, in any case, be compelled to organize upon some legal basis; and so they preferred to suffer the inconveniences of this law rather than expose themselves to greater ones which would occur from some existing law or from one which might be passed; they believed that the creation of *associations cultuelles,* containing in their provisions, as they were proposed by the assembly of the bishops, the most scrupulously minute precautions in favor of the hierarchy in order to obviate the danger of schism which the new law contained, represented a lesser evil, and that we ought not to sacrifice the part of the Church property which was left to us in that event. It seemed to them that thus we should have the advantages of the law along with its disadvantages, whilst otherwise we should have only the disadvantages of it; and above all, they were afraid of a threatening state of things, in which it would be impossible to organize the material life of the Church upon any legal basis.

Their view did not prevail and it was "resistance" that carried the day. The first phase of it was the solemn condemnation of the law by the Pope, almost immediately, in his encyclical "*Vehementer Nox.*" Therein he reproached the state with great energy for having "violated its sworn promise, and abrogated by its sole authority the solemn pact it had signed, a bilateral contract binding on both parties," and that without any notification to the Holy See, "without the courtesy which is never omitted in dealing with the smallest states." Then followed a detailed criticism of the law in its principles and provisions and, at the end, an absolute condemnation. Moreover the Pope announced that he would send at the proper time definite instructions.

That encyclical was received with an extraordinary enthusiasm by an immense majority of the clergy and the laity. Language so energetic was a solace to hearts and consciences borne down by a long series of oppressions supported in silence. When the government, according to Article 16 of the law, sent its agents into the churches to take the *inventories* of the buildings and of the furniture, they met a quite unexpected resistance in many places, especially in Paris, in the north and centre of France and in Brittany. They were very often obliged to come with armed force, and the soldiers were employed in a service which was very painful to them and to their officers, some of whom resigned and sacrificed their careers to their religious convictions.

The final decision of the Pope was looked for with great anxiety. It came on 10 Aug. 1906, and was read on the 15th of the same month in all the cathedrals of France. It declared definitely that no *association cultuelle* of any sort could be organized, "as long as there was not given by the government a positive legal guarantee that in these associations the constitution, the rights, the hierarchy and the property of the Church would be perfectly protected and secured."

The bishops, assembled in Paris, wrote to the Pope a letter of absolute submission and decided to maintain provisionally the *statu quo,* that is, the continuation of public worship in churches as long as the agents of the government would not attempt to expel the worshippers by force.

The government paid no attention to the decision of the Pope and of the bishops. As the Church had to create *associations cultuelles* before the 11th of December under penalty of losing everything, all the properties of the dioceses and of the parishes, down to her last cent and her last candlestick, the little statesmen who took her simply for a political machine awaited with confidence the momentous date, thinking that, if by chance the Pope did not understand the situation, priests and laity would understand and act accordingly. The month of December approached, the 11th of December came, and no associations were formed.

That discipline and disinterestedness struck the foes of the Church with amazement. But surprise was not the only sentiment of the members of the government. According to their own admission, they had foreseen everything except what happened, and they did not know what to do. They drew back for a time; they accorded to the Church a year of delay, a year of grace, one might say, during which she might have a chance to reflect upon her best interests, and during which also the ministry might be changed.

Nevertheless they did not wish to appear to yield entirely and to allow the Catholics to make use of the churches just as if the Concordat were still in force. They took the law of 1881 on public meetings, modified it by a simple ministerial decree, so as to make it applicable to religious services, and declared that they might be celebrated in the churches upon a mere annual declaration made before the mayor or the prefect. But they were careful to add that the officiating priest would be nothing more in his Church than an occupant without legal title. He would have no right to act as a proprietor; still less could he make any disposition of the property. The ministerial circular further declared that he "should have no right to charge or collect any sum for the use of the Church and of the objects which it contains." In other words, the priest had in the Church the same rights that a traveler has in the public streets.

As the Pope said in his encyclical of 6 Jan. 1907, the annual declaration might have been tolerated, although it did not offer any legal security. But the situation thus created for the priest in his church was so humiliating and precarious that it could not be put up with. Pius X, consulted by several prelates, telegraphed to the archbishop of Paris: "Continue worship in the churches. Refrain from any declarations." As soon as this response was communicated to the bishops by Cardinal Richard, the Cabinet decided with feverish haste measures which otherwise would have been carried into execution only after a period of from one to five years. Within a few weeks all the archbishops and bishops were driven out of their homes, all the pupils in the theological seminaries of every grade were turned out; all the personal property, all the religious houses belonging to the dioceses or to the parishes, were confiscated without the slightest exception, even in cases where the state had contributed nothing either to their acquisition or construction.

To complete the picture, it would be necessary to show thousands of priests and several bishops dragged into civil courts for having said mass, for having dared to pray to God in the churches without having made the previous declaration required by the Briand circular, and acquitted or condemned (as were about half of them) according to the interpretation of the judge before whom they happened to be brought, because, if it was a crime according to the ministrial circular, it was not an offense according to the law invoked. This sort of thing appeared so ridiculous and so odious to public opinion that the government gave it up soon after and got up a new law to regulate in some manner the conduct of worship. This law ratifies and approves of all the confiscations and spoliations of which we have been speaking. That is the only point in which it is clear. For the rest it only organizes anarchy and enacts arbitrary will. For instance, by a very peculiar application of its idea of separation, it turns the churches with their property over to the town councils; and we have seen those bodies in certain cities trying to interfere in such matters as the length of time children shall receive religious instruction, the date of the first communion and other religious functions.

In reality the men of the government do not know any way out of the difficulty. They feel themselves to be in a very embarrassing position. Everything in the law was arranged as adapted for the so-called *associations cultuelles* which were the only authorized and legal organizations for public worship, and now, by the prohibition of the Holy See, which the government was so proud to ignore, there are no such associations for worship. So they will be obliged to propose laws according to each circumstance, which will never end the matter definitely, so long as they deny to Catholics the right of organizing the practice of their religion in conformity with the principles of their discipline and their hierarchy as it is done in America.

The Church on her side suffers extremely from this situation, especially in country parishes and in poor dioceses. But what worries her the most is not the loss of all her former properties, which have all been taken by the government without exception; it is the absolute impossibility of acquiring new ones, and of organizing anything at all. The Church, because she would not organize in the form of *associations cultuelles,* such as provided by the new law, has no legal right to exist. That is to say, practically nobody or nothing can represent a diocese or a parish in the eyes of the law. In America parishes and dioceses are represented sometimes by an incorporated board of trustees, sometimes by the bishops as a corporation sole or in fee simple. But in France now there are no bishops and no rectors of parishes as such, no trustees, no vestrymen of any kind. The little wealth which the Church may happen to acquire and which the faithful may give to the bishops or the priest by hand will help them to live from day to day, but it belongs to the recipient, as an individual, and if he dies, neither the diocese nor the parish, but only his personal heir, have a right to his property.

The bishops and priests, even as individuals, have no legal right to the churches nor to any furniture in the churches. And still they continue to use them, because the government does not dare to close the churches, knowing perfectly well that Frenchmen, however indifferent many of them may be on other points, want to have their churches open for baptisms, marriages, burials and first communions. Manners and customs of a people, imbued with Catholic faith and ideals for so many centuries, defeat the law hastily established by a mere political party which does not at all represent the truest and deepest feelings of the people. In reality, the present situation cannot remain as it is. Reason and justice will repair in the near future the ills from which the religious portion of the nation is suffering; and this, all the more certainly because through trials and bitter experience this portion will have learned not to exact unreasonable conditions, but will content itself with freedom. The Catholics of France ask for liberty as it is in Brazil and other countries which have recently made the separation between Church and State, and which have done well with it. There is a liberty for which they do not ask, so far does it surpass their hopes. It is that liberty which exists in the United States. It would be too complete for our customs, impregnated as they are with the habits of Cæsarism and of absolute monarchism. Who knows, perhaps, but that such a salutary example after all will exercise a healthy influence upon us by helping us to enlarge our own freedom and acquire a spirit of mutual concord, by showing us that the greatest republic and the greatest democracy that history has known since the beginning of the world is at the same time able to be the most tolerant and the most respectful toward the rights of conscience and the rights of God.

Abbé Felix Klein,
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12. EDUCATION AND THE EDUCATIONAL SYSTEM OF FRANCE. The Development of Education.— The organization of education in France as a public service is of comparatively recent date. Before the Revolution of 1789, teaching was considered as essentially a matter of private enterprise, and little, if anything, had been done to regulate and control it. Naturally enough it was the Church that first understood the importance of instruction and the first masters were members of the clergy. As far back as the 10th century there were monastic and cathedral schools scattered all over the kingdom, which possessed a large population of scholars and attracted students from the most remote parts of Europe. At the end of the 12th century some of these schools had already developed into universities. The University of Montpellier, the most ancient of all, was established about 1125; that of Paris about 1150, and others followed rapidly; Orléans 1200, Angers 1220, Toulouse 1230, Grenoble 1339, etc. In their turn the universities gave birth to a number of colleges, and after the great revival of learning at the Renaissance the latter multiplied so that in Paris alone there were more than 50 of them. As to the universities, they, too, steadily increased, and when the Revolution broke out in 1789 there were no fewer than 25 in France, Paris being the most important with 6,000 undergraduates. But so far, little had been done for the education of the people at large, and learning had remained the portion of an «élite.» Primary instruction was given in small uncomfortable schools by masters not often qualified for their task: teaching the rudiments was looked upon as a trade, and the customers were few, because few were able or willing to pay. Yet a universal feeling prevailed throughout the kingdom that this state of things was to be remedied, and when the «Etats généraux» summoned by Louis XVI assembled in Versailles in 1789 there was a loud cry from the third Estate (Tiers-Etat) and the clergy for better schools and a wider diffusion of instruction among the people. They distinctly asked for a national education of all classes, by means of national schools. But the expense entailed in the execution of such a vast scheme was obviously too much for the public treasury, exhausted as it was by continuous war. «The Constituante» adopted the principle, but two years later when the members of the «Législative» were asked by Condorcet for 24,000,000 francs as a first outlay, they were obliged to reduce the estimate to a paltry 200,000 (29 May 1792). In spite of repeated discussions in the assembly concerning the opportunity of making education compulsory, and of several decrees trying to enforce its decisions, nothing really effective could be done for the time being. The first practical measure was taken by Lakanal and the «Convention» (27th Brumaire year three) when they granted a subsidy to the primary schools then extant, and created training schools to recruit masters. This was but a very imperfect solution, and one that only partially met the wishes of the people, but it was the greatest effort made by the Revolution to solve the problem of a national primary education. More was attempted in favor of secondary education, which received a common program of studies combining scientific with classical training, and for which the act of the 7th Ventôse year three established the so-called «central schools.» A new plan of secondary education, drawn up by Napoleon, then first consul, with the help of Fourcroy and adopted by Parliament (1 May 1802) brought up to 36 the number of the central schools, which took the name of «lycées» and which were provided with the necessary staff of masters and an effectual budget. And it was only the beginning of a vaster scheme, for in 1808, when he had become emperor, Napoleon, with a view to forming a young generation devoted to the Imperial régime, founded the Imperial University, "exclusively entrusted with the mission of teaching and giving education in the whole Empire." It was a complete organization of education in three degrees, elementary, secondary and superior, placed in the hands of a privileged corporation, which, in the intention at least of its founder, was destined to abolish private education everywhere and in all its forms. This total abolition, of course, was as yet impossible; so private colleges were tolerated, but only under the control of the omnipotent University and with the main object of recruiting pupils for it afterward. Moreover, of the national primary schools that were so badly wanted, few, if any, were created; Napoleon's University merely adopted and, so to speak, legitimated those which existed already. Guizot in 1833 for the first time seriously took in hand the interests of popular education; under his influence the primary schools increased in the proportion of nearly 900 a year (24,000 in 1847, against 9,000 in 1830).

However, it belonged to the Third Republic to achieve the task conceived by the Revolutionaries of 1789, unsuccessfully attempted by their successors and only begun by Guizot himself. In 1882 Parliament adopted Jules Ferry's famous education bill that rendered primary instruction compulsory and gratuitous. Nor was its interest limited to the more elementary and democratic form of knowledge, all the departments of education were infused with a new life: 800,000,000 francs ($160,000,000) were spent on new buildings including Faculties and Lycées as well as schools, and the annual educational budget was raised within 30 years from 44,000,000 francs to 225,000,000 francs.

These figures, of course, must be understood to represent the share of the state only, not the total of the expenses connected with education; besides the national schools and faculties, there exist a very large number of private institutions, of which further mention will be made.

Organization of National Education.—The modern "University of France" is still to some extent organized as was Napoleon's "Imperial University"; only it is no longer, as it was then, an independent corporation. Since the creation of the Ministry of Public Instruction by Charles X (26 Aug. 1824) it has been administered directly by the state, as the other great public services. The supreme authority is officially in the hands of the Minister of Public Instruction, who, however, is helped in his decisions by the directors of the three departments of superior, secondary and primary education, and more effectually still by several deliberating assemblies of professors and officials, the most important of which are the University Council and the Committee of Public Instruction. As direct representatives of the central power, 15 *rectors* residing in the 15 university towns has the supervision and management of all educational matters in their academy (or academic district). Each academy possesses also an assembly of professors elected by their colleagues, the Academic Council, in which are treated pedagogical and administrative questions interesting the academic district. Under the rector are placed *Academy Inspectors,* who have the care of secondary and primary instruction, and under them again *Primary Inspectors* who superintend the primary schools.

Thus the three different branches of education are grouped into one vast administrative organism, insuring their homogeneity and the necessary unity of direction. Each of them, however, being destined to meet distinct and separate wants and consequently being managed on a distinct and separate plan, it is necessary to view them each by itself.

Primary Education is compulsory for all children from 6 to 13; those who do not attend the government schools (where it is gratuitous), are obliged to prove that they receive proper tuition either in a private school or at home. The matters taught are reading and writing, orthography, composition, arithmetic, the elements of natural history and natural philosophy, history, geography, drawing and singing and also gymnastics for boys and needlework for girls. At the end of their regular course of studies, those of the pupils who want a more substantial and wider instruction, and yet do not choose to go to a lycée or a college, may get it in one of the 350 "superior primary schools" created within the last 25 years, or attend the so-called "complementary lectures" where superior schools have not yet been established. This "superior primary education," which in some points is like a sort of cheap secondary education, has, however, a more practical and positive object than the latter and is better suited to the wants of the working and commercial classes. For such of the young men or girls who cannot spare the time to complete their studies in superior primary schools, there exist in all towns and in most villages evening classes, which, it is true, are due to the masters' own initiative, but which at the same time are officially recognized and encouraged by the academic authorities.

Everyone possessing the necessary diplomas may apply for a post of master or mistress in a primary school; but the government, understanding that good teaching can only be given by well-trained teachers, has provided in each of the 83 districts called "départments" two training schools, *Ecoles Normales Primaires,* one for girls and one for young men, in which the future masters and mistresses are kept and educated for three years at the expense of the state. Schoolmasters and mistresses are appointed and promoted, not by the minister, as is the case for the professors of the other two degrees of education, but by the prefect in each department, with approbation of the Academy Inspector.

Secondary Education is given to the boys in 112 lycées and 231 colleges. A lycée is properly a public school, being the property of the state, kept and administered by the state; whereas a college is a municipal institution. In both the professors are appointed by, and placed under the authority of, the Minister of Public Instruction; in both also the matters taught are the same; yet there is a difference between them as regards their respective importance, the average number of boys in a lycée being 500 to some 200 in a college; and instruction in the former being generally recognized as of a higher standard. In the lycée the masters are divided into two classes: the "agrégés de l'Université» (i.e., fellows) who hold a regular professorship, and the licenciés (M.A.) who are simply «chargés de cours» or lecturers. In a college the professors are only licenciés.

Within the last 25 years the secondary curriculum has been repeatedly modified; originally it comprised only two parallel courses of study, of which one was chiefly classical and the other chiefly scientific. It has now become more complex: the division in two sections is kept through the lower forms up to the third, after which the boys have to choose between four sections according to the «specialties» they think will be most useful to them in after life. These specialties, which are part of the staple or secondary education, are coupled into four groups: (1) Latin and Greek; (2) Latin and Modern Languages; (3) Latin and Sciences; (4) Sciences and Modern Languages. At the end of the first form, generally at the age of 17, the boys undergo one of the four examinations corresponding to the section to which they belong, and then spend one year more in the study of philosophy or of the more advanced mathematics, after which another examination (the second of the «baccalauréat») successfully passed gives them the title of «bachelier,» the official conclusion and stamping of secondary education, the possession of which is necessary for most liberal professions, and absolutely requisite for admission as regular students at the University.

Up to 1881 the state had provided no regular system of education for girls. In spite of a not very successful attempt of Duruy in 1867 to organize lectures for them with the help of professors from the boys' lycées and colleges, it may be said that the girls had really no choice but between education at home or in private schools, chiefly in convents. Within six years (1881–87) 35 lycées and colleges for girls were founded in as many towns, and the number has since rapidly increased. In these the lessons are now given everywhere by lady teachers qualified after studying in the universities or in the special training college of Sèvres. There was at first a strong prejudice against these establishments among the families that were accustomed to another sort of feminine education, but it is gradually dying out, though it cannot be denied that, even at the present time, the great majority of girls are still educated in private and congregational schools. There are 54 lycées for girls (20,339 pupils) and 84 municipal *collèges* (12,943 pupils).

Superior Education.— Of the 25 universities that existed in France before the Revolution, 13 were suppressed in 1793 and have not been reopened since; four new ones have been created, bringing the total to 16. Here they are in the order of their foundation: Montpellier (1125), Paris (1150), Toulouse (1230), Grenoble (1339), Aix-Marseilles (1409), Caen (1431), Poitiers (1431), Bordeaux (1441), Besançon (1485), Nancy (1572), Dijon (1722), Rennes (1735), Lyon (1808), Lille (1808), Clermont (1808) and Algers (1849).

A university consists of four Faculties: Letters, Sciences, Medicine and Law. At the head of each Faculty is a dean elected by the professors and placed immediately under the rector of the university, who, it must be remembered, is the head of the academic district of which the university is the centre. The lectures in each Faculty are given by «professors» who must be doctors, and «maitres de conferences» (tutors or lecturers) who are agrégés (fellows). These lectures are open to all undergraduates that have duly matriculated, i.e., who, being in possession of the necessary diploma of «bachelier,» have entered their name on the Faculty's register and paid the matriculation fee of 100 francs a year. This, with 30 francs for the use of libraries and laboratories, is all that the undergraduates have to disburse. Such small sums of course cannot be regarded as an equivalent for the lessons received, but as a kind of duty exacted to ensure the legal status of the student. Officially, superior education, like primary education, is gratuitous.

Two degrees may be taken at a university: The first is the «licence» (the old *licentia docendi*) for letters, sciences and law, and the second the degree of doctor which is the reward of at least one scientific work (thesis) presented and publicly discussed by the candidate that must already be «licencié.» The old medical licence having been suppressed long ago, doctors of medicine make an exception to the otherwise general rule that to be a doctor one must first be a licencié, but the test of their attainments and ability is previously made in progressive examinations during the course of their studies which extend over five years at least.

To the universities proper that have been enumerated above should be added the Superior medical schools of Amiens, Angers, Limoges, Nantes, Rheims, Rouen and Tours. As regards the University of Paris, one would have a very incomplete idea of it if one limited it to the four Faculties that have the Sorbonne for their centre. It includes a large number of establishments of which the Collège de France, École des Chartes, Museum, École des Hautes Études, École des Langues Orientales are only the principal. More or less directly connected with it, though not all placed within the authority of the Minister of Public Instruction, are also the École du Louvre, École des Beaux Arts, École des Arts Décoratifs, Conservatoire, École Supérieure des Mines, École des Hautes Etudes Commerciales, École des Sciences Politiques. Even if one leaves these schools aside, and only takes into account the former, that are the natural complement of the four Faculties, the University of Paris appears as something unique in the world. To give an idea of its importance it suffices to say that of the 21,033,778 francs annually spent on superior education, 9,952,191 francs, i.e., almost one half, are absorbed by the University of Paris alone, and that the number of its undergraduates exceeds 19,800.

Whether this affluence in Paris is a good thing may be and has often been discussed; it is a fact that it takes from the provincial universities their best teachers and a large proportion of their students, but at the same time it is undeniable that this very density of the scholastic population of Paris is a strong stimulus to intense intellectual labor: there is no place in the world so replete with illustrious names or so productive of remarkable achievements, both literary and scientific.

Private Education.— The monopoly of teaching which Napoleon had given to the Imperial University, and which the Royal University retained after it, was abolished, practically in 1830, and officially in 1850 by the Falloux Bill. This bill, though recently modified in many of its clauses, has not been recalled as regards the liberty of teaching.

The development of the public schools was everywhere attended by a parallel increase of the private ones. It is worth remarking, however, that this régime of liberty chiefly served the interests of the Catholics who, opposite the State University of France, built up, as it were, a university of their own, including establishments of the three degrees, primary, secondary and superior. Indeed, so preponderant is their influence in the so-called "enseignement libre," that a private school is generally understood to mean a Catholic school.

The private establishment being as exact a copy as possible of those which belong to the state, there is no necessity to insist much on the subject. Yet a comparison of their respective importance cannot be dispensed with. With regard to primary education, the state establishments are far ahead of the others, with 69,633 schools, 122,607 teachers and 4,661,000 pupils, against 13,462 private schools kept by 37,375 private teachers and receiving 1,067,200 pupils. It was chiefly in secondary education that the competition of private industry was successful, for the French middle and well-to-do classes are to a large extent favorable to Catholicism. The number of boys is not so high in private colleges as in the state lycées and colleges: 72,000 for the former against 100,203 for the latter. The competition is more successful still as regards the education of girls; the state colleges, it has been said before, attract but a comparatively small number of them. Here the Catholics have an undeniable advantage, but they are far behind with their universities. They gave the utmost of their effort in 1875 when they founded three Catholic universities in Angers, Lille and Lyons, and a Catholic Institute in Paris. For these they are wholly dependent upon charitable foundations (superior education being gratuitous and the matriculation fees being received by the state); so, far from being able to increase them, they experience great difficulty in maintaining what they have created. On the whole, therefore, the superiority of the state establishments is obvious and assuredly sufficient to reward the pecuniary sacrifices of the nation.

A law passed on 1 July 1901, amended and completed in 1904, ordered that all the schools under the management of religious orders (congréganistes), should be closed within 10 years. Private schools have therefore become less and less numerous, as most of them (especially secondary schools) were managed by *congréganistes* (*Jésuites, Maristes,* etc.).

Professional and Technical Instruction. —Among the schools and institutions of technical instruction we must mention the following military schools: École Polytechnique, which is perhaps the most famous of the kind for the training of artillery officers; École de Saint-Cyr, École de Cavalerie at Saumur, École Supérieure de Guerre (Paris). The Naval School of Brest forms naval officers. The following institutions deserve also special mention: École des Arts et Métiers (Paris); École Centrale des Arts et Manufactures (Paris); École des Hautes Études Commerciales, Paris; École des Mines (Paris and Saint Etienne); École des Ponts et Chaussées (Paris); École des Beaux-Arts (Paris); École Nationale des Arts décoratifs (Paris), and also numerous practical schools of commerce and agriculture in the provinces.

CONDITION OF PRIMARY INSTRUCTION.

Description of Schools		France and Algeria		
		Schools	Teachers	Pupils
Infant schools				
Public	Lay	2,749	7,079	506,544
	Clerical	....	....	....
Private	Lay	1,162	1,530	91,234
	Clerical	65	129	10,537
Total		3,976	8,738	608,315
Primary and Higher Schools:				
Public	Boys' and mixed	69,633	57,633	2,474,498
	Girls'	....	64,974	2,127,497
Private	Boys' and mixed	13,462	8,397	367,407
	Girls'	....	28,978	699,849
Total		83,095	159,982	5,669,251

The cost of public primary instruction was:

		Francs
1870		61,640,000
1875		77,687,000
1880		108,185,000
1885		170,604,000
1890		177,142,000
1895		207,333,000
1900		217,878,000
1905		280,917,000
1914	over	300,000,000

CONDITION OF SECONDARY INSTRUCTION.

Public Institutions	1912		1913	
	Number	Pupils	Number	Pupils
Lycées (for boys)	112	62,092	112	62,879
Communal Collèges (for boys)	230	36,796	231	37,324
Lycées (for girls)	53	19,898	54	20,339
Communal Collèges (for girls)	79	11,882	84	12,943
Secondary Courses	57	5,565	55	5,076

CONDITION OF HIGHER INSTRUCTION.

(State Universities.)

The number of universities is 16. The most important of all is the University of Paris. The number of university students was as follows in January 1914:

	French	Foreigners	Together
Paris University	15,186	4,319	19,505
All French Universities	38,396	7,895	46,291

Among the French students, the total number of men was 35,849; women, 2,547. Among the students of foreign nationality the number of men was 6,188; women, 1,707. The following table shows the distribution of the total number of students by faculties in France:

Students of Law	16,614
Students of Medicine and Pharmacy	12,794
Students of Sciences	7,976
Students of Letters	8,907
Total	46,291

Charles Petit,
Agrégé de l'Université;
Professor at the Henri IV Lycée, Paris.
Revised by Marc de Valette.

13. FRENCH LANGUAGE, in a general sense the language of France, more especially of the langue d'oui country, and of those regions outside France speaking the same tongue as that of the French people. In a more restricted sense it is applied to the literary language of the country. In speaking of the French language it is customary to exclude the Provençal and kindred dialects of the langue d'oc country. Most reviewers of French literature state that the French language is divided into two great dialects, the langue d'oui and the langue d'oc, each having its own separate literature. But the reviewer usually contents himself with passing in review the activities of the langue d'oui, to the complete exclusion of those of the langue d'oc. Behind this attitude of the reviewers of French literature lies the influence of centuries constantly exerted, both consciously and unconsciously, to denationalize the Provençal and native tongues of southern France.

Origin.— French is essentially a Latin language, to which has been added a considerable admixture of Celtic, German, Greek and dialectic Latin, with a very much smaller number of words borrowed from English, Italian and other languages. Not only does it belong radically to the great Indo-European family of languages, but its borrowings and admixtures have been almost exclusively from sister languages all members of the same family. The Tuscan and Greek elements in French (exclusive of scientific terms) have come into the language almost exclusively through Latin. The Celtic elements are the survival of vocabularies from the languages and dialects spoken over a considerable portion of Gaul before its occupation by the Romans. The German elements were introduced by the invading Germanic races who overran the country on the decline of the Roman Empire. Cæsar is the authority for the statement that, even in his day, Celtic, Iberian (Basque), German and Latin were spoken in different parts of Gaul. Of these tongues the most important, at this period, was the Celtic, which extended over the greater part of the country. Considerable German was spoken in the north of Gaul, especially in the Seine and Marne districts; while Iberian was the tongue of Aquitaine, Garonne and the Pyrenees regions. A dialect of Latin was spoken in the Narbonnaise district. All of these had their influence on the changes undergone by the Latin language in its slow centuries of transformation into modern French and the various dialects spoken in France to-day.

The Roman conquest of Gaul was partially a feat of arms; but it was much more a triumph of Roman diplomacy and genius for colonial government. Roman power in Gaul was centred in the larger cities and in their strongly fortified camps. There the laws and decrees of Rome were promulgated and the tribute of the conquered tribes received. There, too, the law courts were held and justice administered. Rome bent her efforts to the Latinizing of her newly-acquired possessions. Gradually she forced the inhabitants of the larger cities to use the Latin tongue. But this forcing was done in a most diplomatic though effective manner. Even in the days of Cæsar, Latin was made the only medium for the administration of the law, the promulgation of decrees, the exercise of the functions of government, the administration of justice and the performing of the offices of religion. It was the only medium of commerce and trade with the Romans; of literature and art, of the theatre and of social relations. Above all, it was the only road to office under the Roman government and to political preferment. The Roman officials in Gaul encouraged and rewarded the mastery of the Latin tongue and the acquirement of Roman culture, customs and manners. Thanks to this well-defined policy of the Roman government, native Gauls were found in important offices even in Cæsar's time. The number of these Gallo-Roman offices increased rapidly, and their influence was steadily exercised in favor of the acquirement, by the natives, of the Latin language. A greater inducement still was held out to the Gauls to acquire the ways and culture of their conquerors. This was the prospect of employment or political preference and honors in the imperial city of Rome itself. Under this pressure so diplomatically applied, the study of the Latin language, grammar, literature and oratory became a passion throughout the cities of Gaul, which were full of Roman merchants, traders, teachers, philosophers, lawyers, artists, sculptors and seekers for political and other offices. Latin was the symbol of success in every avenue of life. Native Gauls became noted merchant princes, lawyers, soldiers, local potentates at home and favorites of powerful political personages in Rome, and even in the colonies outside Gaul. Natives of Gaul, too, reached the highest offices in the land, becoming even members of the Senate; and later on, a native Gaul became one of the most noted of the Roman emperors. The political policy of Rome made the imposition of the Latin language upon the cities of Gaul a comparatively easy matter, requiring only time to assure its accomplishment. Everywhere, throughout the populous cities of Gaul, there sprang up schools that rivaled, in their efficacy and reputation, the most famous institutions of Rome. Rich Romans sent their sons to these schools because of their excellence and the added advantage that they could acquire there a first-hand knowledge of the life and customs of the natives, whom they might be called upon, in the future, to govern, or to have political or other relations with. Thus all urban Gaul traveled Romeward — «all roads led to Rome.»

Native Languages.— The influence of Roman culture extended itself much more slowly over the rural districts, the inhabitants of which, in addition to being much more conservative and passionately attached to their native institutions and language, lacked the incentive of ambition and of commercial and trade necessity. A powerful Druidical priesthood held the rural Celts together and set their faces against Roman culture and religion. But even in the rural districts Latin made its way slowly and in a mangled form; yet none the less surely. This was accomplished almost entirely through the natural pressure from without exercised by the growing power of the Latin tongue, which had greatly increased during the reign of the Emperor Claudius (41–54 A.D.). Claudius, who was born in Lyon and educated in Gaul, opened to the Gauls all the employments and dignities of the Empire. In the construction of the many extensive public works he employed many inhabitants of Gaul in positions requiring faithfulness, honesty and skill. These, in their turn, frequently drew laborers from the rural districts of Gaul. These latter, during their residence in Rome or other Italian cities, or in the populous centres of Gaul, acquired some knowledge of Latin. Thus, in time, through these and other agencies, a sort of lingua franca sprang up throughout the rural districts of Gaul and served as a medium of communication between the Celtic-speaking population and the inhabitants of the cities and towns. This consisted of a frame of Latin words stripped of most of their inflections and subjected to word-contractions and other modifications. Into this frame were fitted many native words which had already become the property of trade and commerce and the other activities of life in the city, town and country. Thus, as the influence of Latin became stronger in the cities, it continued to exercise greater pressure on the rural districts. This pressure soon began to react upon the centres of Latin culture. The uneducated classes of Gaul everywhere, even in the cities, spoke very imperfect Latin, the genius of which is so different from that of the native tongues of Gaul. But while the cities afforded some correction for this universal tendency among the masses to corrupt the Latin language, the life of the rural districts, where the native tongues were still universally spoken, made the disintegration of the highly-inflected Roman speech unavoidable. As the masses in the city and country became more Latinized, at the expense of their native tongues, the corrupted Latin spoken over immense districts of the country tended to pass current as the speech of the populace and to crowd out classical or school Latin. As this corrupted local Latin varied greatly in different parts of the country, due to linguistic and other influences, there resulted numerous Roman dialects throughout Gaul, many of which are still in existence.

New Influences.— The introduction of Christianity gave additional impulse to the study of Latin which soon became the official language of the Christian Church; and it was taught everywhere by the priests to the middle and upper classes; and they also encouraged the masses to learn it. It seemed as if this was destined to maintain the prestige of Latin as the official language of the country. But in reality it hastened its downfall, by making it more and more the language of the illiterate masses. Soon the rural districts furnished priests who spoke their own Roman tongue; and the struggle to rehabilitate the literary Latin among the masses was abandoned. The numerous French dialects of Latin had already begun to assume shape when the decline of the Roman Empire brought the Germanic tribes down upon Gaul and introduced a new element into the Romanic speech, which had already worked its will upon the tongue of the Cæsars. Under its influence the loose Latin construction disappeared; articles and prepositions took the place of the inflectional terminations brought to a high state of artificial perfection in Latin; and the wholesale suppression of unaccented syllables had so contracted the Latin words that they were often scarcely recognizable. The modification of vowel sounds increased the efficacy of the disguise assumed by Latin words masquerading in the Romanic dialects throughout Gaul; and the Celtic and other native words in current use to designate the interests and occupations of the masses helped to differentiate the popular speech from the classical Latin. Already Celtic, as a spoken tongue, had almost entirely disappeared from the cities; and even in the rural districts it had fallen into a certain amount of neglect, as the lingua franca of the first centuries of Roman occupation, reaching out in every direction, became the ever-increasing popular speech.

Germanic Influence.— The strongest proof that the rustic Latin had become the speech of the masses of Gaul is found in the fact that the Germans, in the course of two centuries, were able to have very little basic influence over it. Had Celtic been still generally spoken, the overthrow of the Roman power and the introduction of German rule must either have imposed the German language upon Gaul or allowed the ancient Celtic to assert itself once more. What did happen was that the conquerors, having to do for the most part with the masses, found that they could do this most conveniently through the medium of the Romanic dialects. The general business of the people of Gaul seems to have suffered but comparatively small inconvenience and derangement on account of the Germanic conquest, as the invaders never came in sufficient numbers to dispossess the original inhabitants who were much more civilized than their masters. The conquerors seem to have soon accommodated themselves to the life of the Gaulish people, the majority of whom were still largely of Celtic blood. One of the immediate effects of the Germanic conquest was to hasten the downfall of the Celtic tongue even in those parts of the country where it still maintained its ascendency, and to drive out Latin as the speech of the ruling classes. The latter, thus dethroned, still remained, however, the official language of the Christian Church. But even by the ecclesiastics it was spoken and written with much less of its literary elegance, and tended to become more and more an artificial speech, since even with the priests, after a century of German occupation of Gaul, it was always an acquired tongue. A century later, we are told, "Classical Latin was understood in Gaul by only a very few, but rustic Latin was understood by everybody." In the 8th century, so thoroughly had the Romanic tongue become the property of the masses of the people that Charlemagne required sermons to be preached in that tongue, into which the homilies of the Church councils had been already translated for some considerable time.

Fortunatus states that, in the 6th century, Celtic was still extensively used in the rural districts of Gaul. It was spoken among the natives while the Roman tongue served to communicate with the cities and towns where it had already become the common speech of the masses and the classes alike. The dethronement of classical Latin as the court tongue and the substitution of German in its place gave the Roman language still greater importance as the one means of communication between the dwellers in the cities and towns and those of the rural districts. Naturally so long as the German conquest continued and the hold of the Franks and other Germanic tribes was not secure on the greater part of the territory of Gaul, the court language of the new masters was German. It was also the tongue of the German officials in office and in private life. The Druidical religion, which had, even before the fall of Rome, retreated to the mountains and other inaccessible parts of the country, seems to have made a final effort to establish Celtic as the language of the masses. But this influence proved altogether local; for the Druidical priests were too far from the centre of activity of the nation and from the spirit of the age. The Romance tongue, therefore, standing midway between the reactionary religio-Celtic element and the court, drew both toward it by the mere force of its general extension and commanding central position. It has been customary to say that the German invaders lost their language in France because they were an uncultured race placed as masters over a cultured. But this is only half a truth. The Germans conquered Gaul and garrisoned it; but they never populated it in the sense of dispossessing the Gaulo-Romanic inhabitants. There is every reason to believe that the invading German host was so comparatively small that it was, in the course of time, easily absorbed by the solidarity of the vast native population rather than by its cultural superiority. In the course of nearly five centuries the boasted Latin civilization, with all its genius for organization and for imposing itself on conquered races, had succeeded only in forcing upon the people of Gaul, or a part thereof, the most distorted and battered semblance of its own noble tongue. And at the end of this long period of time the daughter had so grown away from the mother speech that they stood apart as strangers who could not understand one another. It was quite natural, therefore, that the German invaders, comparatively few in numbers, should have succumbed in the course of time to this powerful young speech, just as the Norman invaders of England, in the course of two centuries, lost their native tongue — this same powerful Romanic speech — to the overpowering strength of the Saxons and the virility of the English tongue.

But though the German language gave way before the Romanic, it dealt a deadly blow to the Latin, the Celtic and the other pre-Roman languages of Gaul. This left the field open, as early as the 6th century, for the development of the Romanic dialects, which had thus risen to supreme importance by becoming the one sure and general means of communication of the whole population of the country, stretching out to the Celtic hilly country on the one hand and invading the palaces of the Germanic princes and kings and the halls of the nobles on the other and driving the German language itself across the Belgian frontier, just as the Provençal had already done in the south of France. The surest outward sign of the victory of Roman over all the other linguistic elements in northern France is the fact that it discarded its old name and became known as French, that is, the language of the Franks, at the time that it had succeeded in becoming the common speech alike of Romans, Celts and Germans. The victorious language was neither Latin nor Celt nor German but a curious mingling of the three with the popular speech of the Roman soldier and colonist in Gaul, a strangely vigorous hybrid born to a new life and destined to a glorious future.

Celtic Elements in French.— On no subject connected with the origin of the French tongue do philologists differ more widely than the question as to the percentage of Celtic words that enter into its composition. Some champions of Celtic have seen real or fancied resemblances to a vast number of Celtic words in modern French, while others would limit Celtic roots in it to about 50. The philological field is still divided into two opposing camps neither of which appears to be fighting the battle along truly scientific lines. The pro-Celtic party is inclined to list all French words for which there can be found a Celtic equivalent or root as Celtic in origin; while the pro-Latin party would exclude from the right to claim Celtic parentage all French words for which there is a Romanic word, whether classical or popular Latin. Common sense indicates that both extremists are wrong. While the Romans conquered Gaul and occupied all or parts of it for nearly 500 years, they never dispossessed the original inhabitants; and the Latin tongue was imposed on the Celts and other Gaulish people very slowly and unevenly. As we have seen, Latin itself suffered very severely in the process of absorption by the Gauls. We have the testimony of many Latin writers that the Romanic tongue contained many native Gaulish words. Numbers of these words were adopted by the Latin writers and found their way into the writings of Latin authors and the utterances of public speakers, especially those educated in the schools of Gaul. It is, therefore, unsafe to conclude, because a word is found in the Latin of the writers following the conquest of Gaul, that it is of true Latin origin; and it is still much unsafer to argue that because a word is found in popular Latin, though not in the classical tongue, that it cannot be Celtic in origin. The fact seems to be that Latin and Celtic acted and reacted upon one another for 500 years before the Romanic dialects gained the ascendency. As Celtic and Latin are sister tongues, it frequently happens that both contain the same root in almost the same form. In this case it is not impossible that both languages influenced the Romanic derivative. It will, therefore, probably never be positively known to what extent modern French is indebted to Celtic and the other Gaulish tongues.

As the Roman language was a sort of lingua franca bridging the way between the Romans and the Gauls who spoke only their native tongue, it contained, in the 4th century, very many words relating to the daily occupations and interests of the natives of Gaul. These included mining, agriculture, laboring occupations and trades. Many of these words are still in the French tongue. We are told that *arpent*, for instance, is derived from the Latin *arapennis*, but the root *ar*, ploughing, is common to all the Celtic tongues. *Bille*, a piece of wood, is also claimed to be of Latin origin because *billa* is the Low Latin for a tree trunk; but the Irish *bile* is also a tree. Another writer claims that *bouleau* (*balai*, a broom) is from Latin; but *beith*, in Irish, is birch, from which the original twig brooms were made just as they still are in Spain and most of the Latin-American countries from branches or twigs; and *bal* is the Welsh for bundle, the form in which the brooms were tied, either by themselves or around a handle. *Cep,* the stock of a plant, may be from the Latin *cippus,* but is more likely from Celtic, for Gaelic contains *caep,* a trunk. *Combe,* valley, has the Welsh equivalent *cwm,* with numerous derivatives from the same root. *Dune,* hill, has the Welsh *ducho,* above, and the Irish and Welsh *dun,* hill; yet certain philologists claim that it is derived from a Low Latin word which is itself evidently from some Celtic form similar to the Irish diminutive *dunán,* a little hill. Fagot is asserted positively to be derived from the Latin *fagus;* yet the Welsh contains *ffagod* and the Irish *fagoid,* and the root word *faic,* a small part or bit of anything. The foregoing examples are sufficient to demonstrate the confusion that has reigned in the field of early French philology and the unscientific methods of many of the workers therein. The trouble is that many of the most strenuous champions on both sides of the question have had no adequate scientific training for their work and have fixed their attention on word resemblances between Celtic and Latin or Latin and French instead of investigating thoroughly the wide field of comparative Celtic language study and that of classical Latin and its relation to the various dialects of Italy in the days of Roman rule. The wide extension of this field and the difficulty of the work therein, together with the imperfect knowledge of the Celtic tongues, until recent years have contributed largely to this confusion and to the encouragement of unscientific methods.

Among other modern French agricultural terms or words related thereto which are claimed to be of Celtic origin are gaule (post, or pole, English, goal-post, where the Celtic or French word and the English compounded have the same meaning), glui (thatch, coarse straw, or bundles thereof), gres (grit sandstone), grève (beach, sandy shore), groseille (currant, gooseberry), guéret (field, fallow ground), guirlande (garland, wreath), if (yew-tree), marne (chalk, clay), motte (turf, peat, clod), pioche (pick-axe), plâtre (plaster), rigole (trench, gutter), roc (rock), ruche (swarm beehive), soc (sock, ploughshare), verne (alder).

Among the names of common animals are numerous words in French that are either from Celtic or have a similar root form in that tongue. These include alouette (lark), cochon (pig), coq (cock), étalon (stallion), furet (ferret), geai (jay), jars (gander), loche (groundling, fish) mâtin (mastiff), mouton (sheep), truie (sow), turbot. These are accompanied with terms relating to animals, as dia (get up, go on, gee!), clavelée (scab), gourmette (curb), gourme (glanders).

The human body, its impressions, tastes and relationships have naturally preserved some Celtic words in French, among which are: barguigner (bargain), danse (dance), dorloter (fondle), gober (gulp), grignoter (nibble), morguer (to bully, defy), rabâcher (repeat), trimer (to go fast), troler (to stroll), brusque (nimble), dru (brisk), sale (dirty), talent, gourmand, moquerie, rogue, souhait (wish). The Celtic language has also contributed to the French language its share of names of utensils, tools and arms including balai (broom), baril, bâton, broche, écheveau (skein), gobelet, hart (halter, band), lance, mortaise (mortise), pavois (large shield), treteau (trestle), treuil (axis, contained in the English compound word axletree, both parts of which have the same meaning). Among the French words of Celtic origin expressing clothing and parts thereof are: botte (boot), braie (breeches, clout), casque (great coat, cassock), toque (cap), trousseau, bouton (button). Barque (hut), brique (brick), cabane, geôle (jail), plâtre (plaster) and rue (street) are all Celtic words relating to dwelling. The French word boudin (pudding), which looks like a corruption of the English word, finds its equivalent in the Welsh word poten. Literally it means the round thing. It is probably connected with the pot in which it is boiled, which is, in Irish, poitin. This is related to the Irish pott, a pit or hole (a round thing). In a similar manner many of the Celtic words in French can be traced through the various Celtic languages. French contains other interesting words of Celtic origin relating to foods, among them being: crêpe (pancake), gâteau (cake), crevoise (beer), leche (thin slice), lie (dregs), tripe, tourte (tart). Celtic derivatives express other relationships of the life of the masses; but the foregoing are sufficient to show the field in which the French words of Celtic are still preserved.

Teutonic Elements in French.—The arrival of the Germanic tribes in Gaul had considerable influence upon the Romanic speech in addition to those already mentioned. It undoubtedly crowded out numerous words of Celtic origin relating to the activities of life and displaced others of classical Latin. During the first century of German occupation of Gaul many Germanic words were introduced into the popular speech. Among these were words relating to war, navigation, legislation, agriculture, hunting, fishing, handling of horses and animals, music, fairy lore, the feelings and passions, colors, necessities, actions and directions. As the masses who spoke Celtic and German, at this time, were ignorant of arts, sciences and letters and all related thereto, the words introduced by the German conquerors and their immediate descendants never enter this higher sphere of life. The joy of living they have well represented in bière (beer), echanson (cup-bearer), gaufre (waffle), goinfre (glutton), malt, soupe, trinquer (tipple, drink). All the German words introduced into the Romanic languages at this period are expressive of the most active and intimate life of the people, with this restriction, they cover a comparatively wide range of subjects and interests. Thus the warlike and boisterous life of the Germanic invaders finds its expression in the modern French words of Germanic origin: bagarre (to brawl, quarrel), brandir (brandish, flourish), butin (booty), dard (dart), escrime (fencing), flèche (arrow), guerre (war), hardi (bold), haubert, maréchal, rapière, saque (pillage), barque (boat), bouclier (shield), bateau (boat), bord (ship), frégate (frigat), houle (swell of the sea), mât (mast), pilote. The life of the ruling class is expressed in the words: baron, eschevin (alderman), fief, frais (expense), franc (true, free), gage (pledge), marquis, riche, sénéchal, saisir (seize), harpe, lai (lay), luth, rime; while the interests of the agriculturists finds expression in such words as blé (wheat), bois (wood), cresson (cress), framboise (raspberry), grappe (grapes), touffe (bunch), haie (hedge), gerbe (sheaf), jardin (garden), marais (marsh), sève (sap), tige (stem), troupeau (flock, herd). The horseman is represented by bride (bridle), croupe, éperon (spur), galop, harnais, maréchal (farrier), train, trot. The life of the hunter and the forest appears in biche (hind), élan (elk), chouette (screech-owl), garenne (warren), hase (doe-rabbit), mésange (tomtit), moineau (sparrow), mouette (gull), trappe, gans (goose), héron. The interests of the house and the family appear in banc (bench), bande, bassin, boucle (buckle), buée (lye washing), caniff (knife), cussin (cushion), fauteuil (armchair), havresac (knapsac), malle (trunk), tonneau (cask), torche. The fisherman has given carpe, esturgeon, lamproie (eel), marquereau, nacre and perle. Among other words expressive of residence are bourg, hameau (hamlet), hangar, hutte, seuil (threshold); while dress and personal ornament are represented by bague (ring), bagage, chemise, coiffe, étoffe (cloth), feutre (felt), froc, gant (glove), jupe (petticoat), pantoufle (slipper), poche (pocket). The passions and feelings are expressed in effroi (fright), étourdi (blundering), frayeur (terror), cri (cry), hair (hate), honte (shame), cauchemare (nightmare), rêve (dream). Large as the foregoing list is it is far from exhaustive of the Germanic elements in active use in the French tongue to-day.

Langue d'oc, the southern French tongue, owing to the fact that the south of France was not so much overrun and for such a continued period of time by the German invaders as the northern half of the country, developed its literary life faster and earlier became a centre of culture and of literary influence. This condition of affairs acted and reacted upon the whole south, upon the neighboring parts of Spain and Italy and upon the more slowly developing north of France. It naturally remained more Latin and consequently more like the languages of Spain and Italy. For almost two centuries it set the literary style for the surrounding countries and did much to awake to a higher life the northern French provinces. At one time it seemed as if Provençal, the language of the langue d'oc dukedoms, was likely to become the dominant tongue of France. But fate was against it. Troubadour poetry and Provençal literature generally had penetrated to the northern courts of France, as Gaul began to be called after the Germanic occupation, and the princes of France were proud to imitate the literary princes of the Provençal countries. The culture of the north grew, as it came more and more under the influence of the south. The Norman, the Picard and the Bourgignon aspirant for literary honors imitated the writers of the brilliant courts of the langue d'oc country, Provençal, Languedocien, Dauphinois, Lyonnais, Gascon, Auvergnat, Limousin; and the best singers of the south country were frequently seen at the palaces of the Frankish kings. But political influences were destined to be more powerful than literary throughout all of France. The French kings, allied with the Christian Church, both received additional strength which finally made them a power in the affairs of Europe. Out of this union sprang a new literature which had its rise in the north of France. The northern kings received a wider vision which inspired an ambition to extend their dominions. This resulted in the gradual subjection of the langue d'oc country to the north. From this time on the southern tongue was discouraged, and the Provençal literature, which had owed its rise to the encouragement given it by the southern dukes, rapidly declined. Soon southern writers set the fashion of writing in French. From this time southern literature practically ceased to exist so far as any influence outside its own country was concerned; and the north country became the centre of literary activity in France. This had been the result of a slow growth from the 8th century to the time of Charlemagne.

French Dialects.— The three principal dialects of northern France were the Norman, Bourguignon and Picard. The latter being the language of the capital and the court gradually acquired preponderating influence which enabled it to submit to its customs and ways of thinking the other northern dialects. This was the more easily accomplished because of the fact that the country was still divided into local centres and interests, each of which had its own local dialect, the total of which embraced almost two-thirds of France. The coming to the throne of the dukes of France gave it great strength, for the new rulers showed special ability for organization. They made their court the centre of the knightly culture of the age; and their dialect the diplomatic tongue of all France. Soon it became the language of all ambitious of acquiring courtly honors and favors. The Picard tongue became the model of courtly speech and manners; and by its own weight and influence gradually imposed itself upon all the other dialects of northern France. By the 12th century the only road open for favors at the court of France was conformity to the polite manners and customs of the court, one of whose inexorable laws was that all courtiers should speak correctly the Picard tongue. In the 16th century the latter became, by royal decree, the court language and the official tongue of all France. But long before this, as early even as the 13th century, French, as the official tongue had already begun to be called, had commenced to spread rapidly and to acquire an influence which was destined to reach to all the courts of Europe, so that it ultimately became the diplomatic language of Christendom. It became fashionable everywhere to speak French, which formed a part of the studies of all higher schools and universities throughout Europe; for France had succeeded in what Rome and the Christian Church had failed. She had become the diplomatic centre of Europe of which her language and literature had become the admiration and the one modern tongue worthy of imitation. French language, manners and culture, therefore, exercised a world-wide influence, the force of which, though diminished, has not yet spent itself. For the influence of French on English see ENGLISH LITERATURE. See NORMAN FRENCH; GERMAN LITERATURE; PROVENÇAL LITERATURE; CATALAN LITERATURE; FRANCE — FRENCH LITERATURE; FRENCH PHILOLOGY AND MORPHOLOGY.

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14. FRENCH LITERATURE. Life is rhythm and movement. It advances in waves. The centuries dash to a flood-climax with ebb and flow. Human thought, as expressed in literature, follows this law. The year 1800, from this point of view, represents a climax achieved and a new departure. The revolution was not completed, but it was confirmed. Its effects flow on to the infinite, becoming diversified, complicated, forever extending. That which seemed but a crisis,— was an advent. Its acute period came to an end ceding the place to new activities. The ground had been worked and the time seemed ripe for fresh conquests. The old world shook off its lethargy and with curiosity one sought to read the future and discover what new surprises it reserved. Aristocratic society so-called no longer existed. Henceforth the people were the dominant factor. Their voice commenced to be heard, their grievances were championed in the press. But in such an innovation entailing a proper preparation and a certain cuture the masses were as yet but amateurs translating their thoughts into phrases lightly copied from the works of the orators of the old Roman epoch. It was the beginning of a journalism emanating from a gossip loving public and disseminated through the medium of pamphlets of a semi-serious and trivial character. They monopolized the power of the old aristocracy and substituted the judgment of the people for that of the *élite*. Accordingly, in 1800, Bonaparte having pacified the intellectuals, dissipated and defined the revolutionary formulæ, one awaited for a new style to be launched from the residue of so much chaos. Now from out the soil of France is perceived the growth of a mighty tree the roots of which deeply embedded bloom forth into powerful branches rising majestically as an emblem in the land. In this way is pictured the intellectual vitality of the country. At the root of this tree is seen a genius serving both as a solid link to tradition and a bold forerunner of the future. This genius, by origin and temperament, is admirably suited to serve as transitory agent between two civilizations destined to progress without opposition to their detriment. That genius is CHÂTEAUBRIAND.

Châteaubriand was to dominate the century. His mind stimulated it. Through him sprang up all those currents of ideas, all those modifications of rhythms. His satellites whatever their qualifications merely followed in his footsteps. He was born at Saint Malo at a time when the old régime was toppling, but not too late for him to comprehend it. He was of noble birth and of refined upbringing. The aristocrat blood in his veins was the basis of his genius, entirely dominating his mind. Born by the seaside in country adjacent to wild land his infancy was spent in solitary roaming, returning timidly to the famous Château de Combourg where the figure of a maniacal father was apt to create a mysterious and gloomy atmosphere. His education corrected and completed his birth, his was a domineering mind as it was imaginative. For these two reasons he found himself solitary and realized that the only remedy was escape and travel. He enlarged his mind by voyages to America, visiting Niagara and Florida, returning from these countries with ineffaceable memories. Through intimate contact with the growing republic of the United States his political conceptions became modified. The life led by the savages of Ohio showed him a simplified humanity. He quite understood the events which recalled him to France. He took side with those of his caste as a matter of «honor»; though his sympathies were with the newcomers. He could feel that the cause for which he was fighting was a forlorn one. The day of Royalty was past. With the fall of the Bourbons he read the sign of the times resulting in the probable downfall of all the thrones of Europe. This idea obsessed him, making him highly melancholy, and consumed with a feverish curiosity. He has revealed to us this dual sentiment, with which is intermingled a superior scepticism and an irony which shield him. He was solitary, egoistic, independent — a lover of self. He was devoted but knew that his devotion was sterile, and practised it merely in an ornamental way. He was an observer of people and allowed himself to be observed. His memoirs teem with portraits resembling in a remarkable degree those of Saint Simon. He judged events and did more than merely understand them by admitting them; he concealed his conclusions — we live them in the present times — he was unquestionably a man of the moment, gifted with foresight, to which much of his success was due. He transferred Christianity from an active domain to an artistic realm, realizing that it was the only means of safeguarding and reviving it. He revered antiquity but did not forget to portray for us other beauties; he was the discoverer of artistic America and all other countries came under his spell. In Châuteaubriand we have a belated classicist, a budding romanticist, a symbolicist *in embryo* and even the sophistry of a decadent school. To him is due the nostalgia of foreign words of which we are not yet cured: Onondagas, Muscogulyve,— all the nostalgia of unfamiliar rhythms; in his description of the dance of the suppliants he has reduced to a state of lassitude the style which Chrysothome calls Athumia or «manque d'âme.» He has said of himself, «Je suis un pénible songe» («I am a troubled dream»). How true is his motto «Je sème l'or.» («I sow gold»). His followers have merely to draw on this inestimable legacy: Victor Hugo, Lamartine, Sand, Barrès and others, all are indisputably his disciples. When expressing himself he expressed the century in its most liberal moods, its most perverse periods and its moments of depression, in a language so fascinating that it constitutes one of the gems of French literature.

Next to Châteaubriand a name predominates, less great assuredly, but one nevertheless of surprising brilliancy: Madame de Stäel. Like him she was an aristocrat by birth and republican by temperament. The French of the Revolutionary period were cosmopolitan in theory while she was in practice. Madame de Stäel possessed the European mind and to her we owe the denationalization of our intellects, the curiosity for penetrating beyond our frontiers. Born of Swiss parents this inclination became accentuated. As an exile she lived at Coppet where she received people from all countries. Expelled from this refuge she traveled throughout Europe, understood it and did her best to make it understood. Like Châteaubriand she extended the boundaries of our comprehension. But she was not an artist, her sphere was intelligence. She described but did not suggest. Her book from Germany, great and beautiful, acquainted us with her intellect, her inner mind, her morals. As she progressed she created romantic criticism. Her mind was critical rather than national. She read everything, wrote of everything, argued on everything. A highly strung and elated being she was a great and extraordinary writer. Connected with her name was one both dear and fatal — Benjamin Constant. Their quarrels, which made diverting reading in their days, only interest us by reason of the works which they bequeathed. Their passion was beauteous inasmuch as it was creative. Benjamin Constant was an orator, but words after all are mere flights of speech and a political career is an ever changing régime. He was his own executioner as well as that of his beloved; one work alone lives, a book of knowledge and deep thought ‘Adolphe.’ It was a masterpiece of acute analysis, of melancholic irony, of clear composition. This little romance made its appearance at the very beginning of the period of Romanticism like a defiant note or a wager, which moreover it won inasmuch as the book lives to-day whereas so many other dull and heavy works of the time have sunk into oblivion. Before touching upon the Romantic period we should not overlook a few littérateurs, a portion of whose works, aside from party polemics, speak more than volumes. Let us cite Joseph de Maistre, stoical and poor, cornerstone as it were of a structure swept by the sea. He disowned all that the 18th century created. He combatted the new ideas already tried and proved successful. The passion of unity animated him, he nauseated that which distinguished and dissociated. To his somewhat puerile vehemences scanty thought would be paid were it not for their almost perfect conception. His ‘Nights of Saint Petersburg’ charm us provided that we discard all reference to the political aspect. In Paul Louis Courrier we have a democrat of a strange turn of mind; a rugged artist, liberal, Voltarian. He also dabbled in politics, but his great talents as a writer mark with immortal beauty the temporary passion which agitated him. His writings live despite their now antiquated subjects. His dialogues conjure up the picture of a wealthy Roman living in his villa enamored of his library and landscape. Lammennais became embroiled in other quarrels: episcopal contests and a bitter fight with deism and Christianity. What remained to him? Time aiding we see the triumph of something which our ancestors believed to have killed forever. Art alone is immortal. In his ‘Paroles d'un croyant,’ a work of an apocalyptical order written in verse, by turns violent and tender, gloomy and serene, no doctrine is formulated but we have evidence of a large and generous mind, one tender, rebellious, graphic, poetical. The work is soberly and powerfully written. Lammenais will live as he was essentially a creator of symbols. J. P. Prudhon, also, will live, not so much on account of the vehemence of his democratic diatribes but as a writer of nature; for instance, when bearing in mind that part of his boyhood spent as a shepherd he narrates in fresh and vigorous terms his first emotions. Royer, Collard, Guizot, Thiers, retain our attention although they touch too deeply on politics to allow of an exclusive literary study being given them.

Compared to them Victor Cousin is more eclectic. A philosopher of the bourgeois class, guardian of propriety of religion, of property, he wrote voluptuous pages of the women of the Fronde period which endear us to him. It should not, moreover, be forgotten that it was he who discovered the precious text of the ‘Pensées de Pascal.’

Romanticism.— We have now reached the great evolution of the century — the advent of Romanticism. The change was not a sudden movement; it had been prepared, its nature defined and its introduction duly announced. It might be said that it existed in embryo and had even taken shape in the works of the past-masters, but certain it is that humankind as portrayed by literature is ever the same. The same potentials exist ready to be exercised as circumstances permit. A high order of genius always leads the way for others to follow. We witness the birth of a new school called Romanticism, an intellectual crisis following closely on the Revolutionary crisis. Châteaubriand was its leader and foreign influences aided its development. The great Breton borrowed ideas from the foremost English classics: Bryon, Walter Scott and Wordsworth; Madame de Stäel introduced the German school with Schiller and the Italian with Manzoni. What after all is meant by Romanticism? It is giving the reins, so to speak, to lyricism, the expression of integral individuality. By dwelling on its more pathetic side and exaggerating it to a veritable paroxysym, the poet voices human thought. Disdaining method and logic it follows instinct without restraint. Disdaining a limited style the poem becomes a discourse, the theatre a witness box and history a poem. The traditions of the past are severed, but only the traditions as the substance matter remains. In Racine was inherent all the degeneracy of the romantic writers. Phèdre closely resembles René. But Phèdre's manner of expression is different to that of René: The mode is the expression which varies its color to renovate our sensations. At this time appear the first works of the romantic style: 'Les Messeniennes' by Casimir Delavigne, 'Panhypocrisiade' by Nepomucène Lemercier, 'Méditations' by Lamartine, the first poems of Alfred de Vigny, the first odes of Victor Hugo. Having appeared without a master, a definition of Romanticism became necessary, and it was Stendhal who launched the first manifesto in his pamphlet 'De Racine à Shakespeare.' Charles Nodier was the central figure around which evolved the younger and less brilliant exponents of Romanticism, their names being, besides those already cited, Emile and Antony Deschamps, Soumet, Chênedollé. A leader became necessary for this new troupe and it was found in the person of Victor Hugo in his 'Preface de Cromwell' (1827). It was also desirable to discover an analyst or legislator who would legitimate the claims of the newcomers, the lot falling to Saint-Beuve. He traced back as far as Régnier and Ponsard, citing André Chénier, to determine the certain affiliation of the new school with the old. This we find in his study of the poetry of the 16th century which he published in 1828. The romantic writers then established their rules and doctrines which were to abolish the cold, absurd academic language and replace it by a sentimental and sensational one using whenever possible evocationary words and local expressions.

Romantic Poetry.— Victor Hugo played the leading rôle in this symbolical romanticism, the origin of which can be traced to Châteaubriand. To practically the whole world Victor Hugo is the poet *par excellence*. As a matter of fact he was the outstanding figure of the century which he permeated with his vocabulary. Is his life's work a wonderful example of French genius or a mere construction of propositions? Both, but in distinct parts. Hugo was proud, adroit, not particularly sensitive, and wished to occupy the foremost place while encroaching on all branches of literature. Living a secluded and bourgeois life his aim was to be the master thought of a perturbed century. He discussed the pros and cons of the great problems of the day and rubbed shoulders with the leading journalists. In the rôle of a prophet he was apt to exaggerate and distort. That which Châteaubriand had indicated he approved, overlooking the fact that a verity ceases to be such once it is an open secret. He was dazzling and disconcerting but he molded new ideas. He exploited everything: his sufferings, his pleasures, his exile. He was not exactly tender although he knew the language of tenderness. He was not brave but liked to strike heroic attitudes. He was a humanitarian because he saw in it the great vogue of the century. He had the mind of a showman, possessed little witty intellect and no sense whatever of moderation. He was quite serenely extravagant, ridiculously vain, merely mediocre — in a word, small. Such was Victor Hugo, but such also is the power of words that this strangely composed mind was able to manipulate them in a wonderfully dexterous manner. Open at random any of his volumes in verse: 'Les Châtiments,' 'Les Feuilles d'Automne,' 'Les Contemplations' and one cannot but be enthralled by the majestic tone of such wildly passionate rhythms.

Lamartine was a great and sympathetic figure who inherited from Châteaubriand an infinite tenderness of entrancing melodiousness. Of gentle birth, a happy boyhood, and an ephemeral love cut short by premature death we have an insight of his life and character in his 'Meditations.' The title itself is an index to his nature. He was vague, uncertain, rhythmical. The soul of this poet beautiful and compassionate is comparable to the nerveless somnolence of a light hearted child. No fixed picture, no precise fact. Read 'Isolement' in which we have 'une montagne,' 'un vieux chêne.' No name, but a couple which is *the couple*. Everything of a circumstantial order, of realism, of a visible form of nature, is effaced. He was musical and from that standpoint will live. Less musical but more profound was Alfred de Vigny. Inflexible but stoical his soldier's uniform served to restrain his heart throbs. His domain was solitude. He knew men as indifferent or hostile with natures either fine or disdainful. There was an undoubted trace of Pascal in Vigny. His was a beautiful mind, a noble figure the brilliancy of which is apparent in his writings. Every fact engendered an idea to him and every idea he transformed into a symbol to which he gave an intense precision. He is considered the most classical of the romantic authors. Alfred de Musset was the most charming. But was he, strictly speaking, a romantic writer? He would seem to be but a semi-convert to the ranks. His works were often of a realistic order. His romanticism merely consisted in passion and suffering. His poesy was easy and fluent, he enhanced a small fact to a symbolical height. He was indifferent to nature. He was a citizen, as a matter of fact Parisian. When he wrote of the night it was not that of October or May or December, it was the night from an atmospheric point of view — the night of his heart. Decidedly he is the most delightful of the romantic authors. Théophile Gautier was the most conscientious. He was a painter and remained so when he took up the pen. Not particularly lyrical his style was hampered, his imagination poor with a horror of the commonplace. He can be defined as a man for whom the exterior world existed. He copied rather than expounded, but he copied with choice and taste. His 'Emaux et Camées' takes its rank among the artistic works. His reserve was a salutary example to his too-wildly enthused group. On quite a different footing was the muse of the times, Marcelline Desbordes-Valmore. She was supposed to be antiquated on account of her advancing age and her penchant for the amorous. The originality of her ideas and rhythm had however to be admitted to the extent that they influenced Verlaine — perhaps even were the making of him. She wrote delightful romances of an infinite sadness which leave a deep impression on the reader. Mention should also be made of Béranger with his sensitiveness of the coquettish, his works being both pleasing and pertinent although of only average quality. These are the principal names which have survived the times.

Romantic Theatre.— The romantic theatre possessed the qualities and defects common to the epoch. Neither rules nor limits were observed. In order to understand it thoroughly it is necessary to determine what it actually was and what it desired to be. It was melodrama in verse. It was a crisis and not a conflict. It was more a profuse use of words than an analysis of an evil. It pretended to be symbolical and comprise in a single type the character of a caste, of an epoch. Philosophical abstraction, a definition of morality, degradation of the races, servitude personifying fatality, sovereignty personifying Providence. No psychology, an excessive simplification swelled by false erudition and local color, one gigantic salmagundi where we are shown man, reality, fiction, nature, the king, the pauper, the buffoon. Such was Hugo's theatre in its numerous and tumultuous dramas, alone saved by its wonderfully lofty tone. He formulated his curious ideal in the preface to 'Marie Tudor.' The theatre was to consist of laughter, tears, the good and the bad, the high and the low, fatality, Providence, genius, chance, society, the world nature, life. Casimir Delavigne, who followed this style but with infinitely less genius, exposed all the defects of the innovation while making no allowance for its qualities. Ponsard in prose followed in a similar strain. A saving clause existed for Alexandre Dumas the elder by virtue of his prodigious imagination. His 25 volumes devoted to the theatre are an orgy of local color wherein we witness the play of bourgeois passions, personal ambition and vested interests. Here are exposed necromancy, imprecations, acrobatics, duelling — it was just one multiplicity of drawn swords, not however without its amusing side. Alfred de Vigny bestowed on his theatre the charming qualities of his poems; while conserving the romantic spirit he possessed a sobriety of style and means which saved him. He was primarily a student of souls and not situations as is borne out in his masterpiece 'Chatterton.' Musset endowed the theatre with an impressive and elaborate imagination. His was the art of creating a plot with a sad or joyous note in which personality alone is expressed. Besides its tragedies, Romanticism possessed its comedies, of which Scribe was the ideal author. During 50 years he supplied the pleasure-loving public with that for which it clamored. His plays were well constructed, clear, and above all had a happy ending; they might be likened to puppets without a soul, as witness his masterpiece 'Bataille de dames.'

The Romantic Novel.— A curious condition during this feverish period was, that men tried their skill at the divers branches of literary art without confining themselves to a single effort. Literature was not parceled out or apportioned. As has been seen, quite a number of poets were dramatists, and we shall further see that many were novelists. Victor Hugo who at first was an apostle and reformer gave in 'Les Misérables,' 'Travailleurs de la mer,' 'Han d'Islande,' and others, a formidable example of his humanitarian declamations and violent antitheses. But here again as in his other works brilliant pages stand out, disconcerting and enchanting. Vigny gave us 'Stello' and 'Saint Mars.' To Théophile Gautier we are indebted for 'Mlle. de Maupin,' a highly curious study of an unsettled mind with its sequel in naturalism and decline. Lamartine wrote the immortal 'Graziella,' and Musset his tales which are pure masterpieces. Charles Nodier wrote in a gamin and laughable style which saves his work from oblivion. As an example of an isolated mind we have Senancourt, whose disconcerting works suggest Baudelaire. Here we are treated to delirious ennui, socialism, exotism, the use of stimulants, a curious determination of the value of divers sensations, the sketch of a symbolism of color and perfume. Senancourt possessed an exasperating sensibility, a troubled mind. He desired to know everything and with knowledge thus acquired to act. He wanted to stand on a pedestal by himself. But virtue, like happiness, consists in conserving, concentrating and cultivating self; it is self will which governs one's actions, it is the effort toward order which organizes one's force It will be seen how fertile in development was this work which in unostentatious manner was the forerunner of modern psychology. George Sand was more completely and more deliberately epochal. A pupil of Rousseau she started her literary career in a humanitarian style. Returning afterward to her native land she wrote intimate, simple rustic pieces such as 'Mare au Diable' and 'Petite Fadette.' A keen student of human nature, herself of a vivacious character with an evenly balanced mind, she proved her talents as a writer. She was psychological and intelligent. She does not confine her characters to mere formulæ, but leaves them undulatory and incomplete. Her works are often of a voluptuous and sensual order, for which we are grateful to her. Another solitary mind of the romantic school was Stendhal. He preceded Hugo and his band, and is more closely allied to us in character. It might even be said that his mind is the élite of all times. Cold, ironical, a disciple of Condilhac, he one day encountered Choderlos de Laclos at the Scala Theatre in Milan, himself a lieutenant, the other a general. In the acquaintance thus formed he acquired the powerful heritage of a redoubtable anaylst. In his works he had no place for externals. It was the heart which counted with him. He was essentially a man of action, his firmness being on a par with his courage. Curious, psychological, he placed energy before everything else: in the 'Autobiography of Henri Brulard' is recorded the anguish and experiences of a self-educated mind which learns of the world by appealing to its own heart. 'Chartreuse de Parme' can only be properly understood by comparison with the stirring times of the present day — the details of a great battle, the event surpassing the individual, an irony in heroism, the analysis of a domineering mind, all so many pages of frigid lucidity almost terrible like brilliant stars in a white light. The Julien Sorel of 'Le Rouge et le Noir' is a character study of ambition on a grandiloquent scale. The genius of Merimée pales beside that of Stendhal. He was studious, composed, intelligent, classical, concise and simple. He possessed one really great gift: writing chapters with material which served his contemporaries for books. A great lesson to be learnt! Next to these two cold personalities we have Honoré de Balzac of a highly complex character. An undisputed artist, if coarse, heavy and indifferent. His works are powerful, inflated, commonplace. That which is, becomes diminished by what he believes it to be. Like Hugo and the elder Dumas he aimed at being a reformer, a great thinker. His real sphere lay in the portrayal of characters drawn from the bourgeois and laboring class. He sketched his characters from life, depicting them with remarkable dexterity. He had a particular penchant for mania, especially that mania which upsets and divides families. We have avarice in Grandet, debauch in Hulot, jealousy in cousin Betty. His great skill lay in holding the attention of the reader without relying solely on the love episode to retain it. He took advantage of all the tricks of the trade of his profession when weaving his plots. He was a bibliopolist and as such analyzed the habits and customs of the people. He is romantic in his portrayal of life and a realist by the wealth of detail with which he depicts it. If we compare his commonplace and precocious works to those of Barbey d'Aurévilly we shall better appreciate the latter. He was complex and belated, an hallucinator of Chouannery. He was however a talented writer and his 'Diaboliques,' 'Chevalier des Touches' and 'Double Maitresse' rank among the finest of the romantic works. On the threshold of militant romanticism appear the two touching figures of Maurice and Eugénie de Guérin. They belong to their epoch by reason of their dolorous life regarding which, moreover, has been given too much prominence. Maurice only lived to write two masterpieces — 'Le Centaure' and 'La Bacchante' — before meeting a premature death. It was sufficient however to immortalize his name. The question arises had he been spared would he have written more, would he have done better? More undoubtedly, better no. These two poems in prose attain an unprecedented beauty by their construction and symbolization. Eugénie was more tumultuous than his brother and we find in his script the beating of a heart covetous and deceitful, the raptures of a soul enamored with nature and grandeur. Mention should also be made of Gerard de Nerval — so unaffectedly French in his modern idyls. To terminate the list we have Saint-Beuve of a restless and pleasing disposition. Not a particularly good poet and only a medium novelist as is proved by his 'Volupté.' He was a critic and historian of the highest order in addition to his qualifications as a poet and novelist. He had a taste for gossiping, was intelligent in a supple, keen, curious, suspicious manner; he exercised his wits on living personalities or the noble heroes of the past with consummate art. His 'Lundis' is unique — reading like a romance of adventure. His story of 'Port Royal' above all is an admirable study of one of the most mysterious forces of the period. A great thinker and a spirited writer it cannot be denied that he made his influence felt on the epoch. He has bequeathed to us delightful characters and dramatic episodes all depicted with a genius particularly his own. This called for a historical and religious style of which the author of 'Volupté' alone was capable.

Romantic Historians.— Of the Romantic historians the reputations of three have lived to our days: Augustin Thierry, whose Merovingian tales resemble an epic poem, Guizot who collected and condensed the efforts of his predecessors, and Michelet, the great evocator of the past, the enchanter of revolutionized times. Michelet introduced science into his poesy to the advantage of the latter. He showed us a France personified struggling to be herself, in other words, a nation free and generous, a champion of civilization and justice. He was of the people, of a fanciful dreamy disposition. He set up a standard which overwhelms us by its unparalleled grandeur. No one understood better than he the occult forces of life and the certain emancipation of a struggling humanity.

The Parnassians.— After so much exuberant clamor it was only to be expected that a new generation would arise diametrically opposed to the preceding one, denying what the other had affirmed and searching new formulæ: the Parnassians and the Naturalists. They were a class of impressivists and pessimists, of great probity of style, a scorn for the oratory element and an unique preoccupation for the plastic in the hope of its complete realization. Their aim was to discern and to discern clearly, dispel mystery and venture on the unsightly with the idea of discovering, alas! the general law of life. All honor to the Parnassian Poets. Their master was Lecomte de Lisle, a splendid figure — disinterested and lonely. From all is hidden his plaints, none will ever know his passions. He vested them with pompous names borrowed from the legends of the Indian, Biblical, Polynesian, Scandinavian, Celtic, German and Christian. He was an erudite, a thinker, a nihilist, an impassivist, a despairing voice crying in the wilderness. A portrayer greater than Théophile Gautier he was a virtuoso of lyricism on a par with Victor Hugo. His work is beautiful, comparable to the porch of a tabernacle resplendent with transient rays. Sully-Prudhomme in comparison to him is more gentle, tender. His note rang false when he introduced science and declamatory effects into his peosy. His sadness alone plays on our emotion, while we respect his unembittered resignation. Francois Coppée had a liking for the humble. But more than the humble did he love the afflicted. By afflicted is meant in this sense those frail beings more miserable than unfortunate by force of circumstances. His style is limited and replete with artifice. His work is prosaic. Théodore de Banville is the acrobat of the group. Uncommonly skilful he manipulated rhythm as a juggler plays his puppets. He was more of a versifier than a poet proper but was gifted with great talents and possessed a keen mind. José Maria de Hérédia's name is incarnate with sonnets. His 'Trophées' is a masterpiece of form and precision. Every page is a book in that they contain a wealth of detail which creates the atmosphere, a precision of tone which denounces the soul — an exact composition of impeccable architecture. The merit of Catulle Mendès lay more in his literary proselytism than in the university of his gifts which empoverished them. A contributor to reviews, poet, dramatist and novelist, he employed in his works the tone of the different people he admired. His reflections are of a remarkably high order. Jean Richepin was verbose after the style of Hugo. In his 'Chanson des Gueux' he wanted us to believe that he was of an independent school which was, however, far from the case. Charles Morice has summed up in a few well chosen words Richepin's undoubted but limited talent: «Vous faites l'école normale buissonnière . . . normale tout de même.» (You play the primary school truant . . . primary all the same).

In naming Charles Baudelaire next it must not be supposed that he ranked after the others, on the contrary he merits a place apart. As a matter of fact Baudelaire would appear to rank as the most important author of the group. His genius was exclusive, the influence and brilliancy of which broadened with the ages. An artist powerful and severe his exaggerated sensibility vibrated through everything he touched. He expressed himself in nuances and half tones with a precision as bold as it was disturbing. His 'Eleurs du Mal' will ever rest immortal as the eternal chant of a body preparing for death. His evocationary prose is one of the most powerful of which we know; his criticism of a calculated and intelligent frigidity. He disconcerted his contemporaries but we to-day know him better — he is part of to-morrow — of all time. Let us conclude with Léon Mérat and Dierx whose 'Lazare' is a really beautiful work. Others, whose names have been forgotten, close this August assembly, some of whom govern us to-day.

Naturalism.— It will be remembered when speaking of the advent of Parnassianism that mention was also made of Naturalism. A new order of things was to prevail. Scientific positivism was to domineer Faith; material interests, moral interests. The leaders were Louis Veuillot, journalist (Catholic notwithstanding), who was vehement and impassionate; Prévost-Paradol, a haughty ironist; Jules Fabre Thiers, Gambetta, and above all Hippolyte Taine, whose influence determined the movement. He was the theorist of naturalism. He reduced the mind to a stream and group of sensations and impulsions, of nervous vibrations. His science was the choice of small important facts, significative, minutely chronicled and dexterously arranged. He restored idea to practice and practice to sensation. For him sensation and movement were the conception of the physical universe. Before his time it was Antoine de la Salle, a friend of Héraut de Seychelles who said «Tout vibre.» Taine endorsed the idea, if not the phrase «Tout vibre,» but under different conditions, and the vibration was modified and regulated by three causes: the race, the place, the moment. His works 'Essais sur La Fontaine et ses fables,' 'Histoire de la Littérature Anglaise' and 'Philosophie de l'Art' express and justify his doctrine which made a great sensation and had far-reaching results. It was a doctrine both curious and enlightened but incomplete. An abstract theorist he was a talented writer and his works abound in fertile imagination. With him, dominating the movement although taking no active part, but sympathizing with it, was Renan, who applied the same relentless methods to the exegesis, the analysis, the criticism of religion. Nevertheless his charm, grace and imagination beguile us. He was an acrobat of the mind with a smiling philosophy and a sweet inflexibility. His dual culture, laic and religious, aptly fitted him to discourse on incredulity. Desiring the truth in religion, too intelligent to believe in its modern presentation, he outlined its numerous phases. Sincere, he changed from certainty; his style and taste are enchanting, to a degree. A representative artist he is a symbolical figure after the manner of Socrates.

Romanciers of the Naturalist School.— Succeeding these leaders we have the younger school: Edmond About, an epicurean whose works, mirthful but not hilarious, artfully conceal much of the scepticism they contain. Fromentin was of a double personality. Painter and traveler he has left us in his 'Maîtres d'autrefois' precious pen pictures of the artists of the North. Novelist at times, he has enriched us by 'Dominique' with one of the finest romances of the century. It was an autobiography like 'Adolphe.' We have the same discouragement, the same analysis of a frail stoic soul, gentle, the memory of which is disconcerting. Armand Silvestre was a poet with 'Grisélidis' and a naturalist writer in his tales 'Les Joyeusetés de la semaine.' Jules Lemaitre has rightly said of him: «qu'il possedait toutes les cordes de la lyre, celle de boyau et celle d'argent.» «He possessed all the strings of the lyre, those of gut and those of silver.» Edouard and Jules de Goncourt were greater and more illustrious figures, naturalists to the manner born. Impassionate, nervous, impressionable, literary maniacs, art collectors and connoisseurs, evocators of the 18th century they were curious but great artists. Their works were of infinite variety and as infinitely beguiling. To the methods of the school they applied the search for beauty to the elevation of their art. Of quite a different character was Emile Zola, the guiding spirit of the movement. Claude Bernard impressed him while the doctrine of heredity disquieted him. It was on this latter that he based his 'Rougeon-Macquart.' We are treated to a series of confused agitations, incoherent situations and limited psychology. We witness the acts of the demented and the appetites of brutes. He generalized and symbolized. His novels are really heavy poems, one might even say a series of hallucinations. He was not capable of drawing a really sympathetic character true to life but was consummately skilful in appealing to the popular imagination. His works make painful reading, leaving a distasteful and depressing effect. His powerful temperament pervades his works — his art is his own — and while his fame may be disconcerting, it nevertheless exists. In comparison to Zola we have the peaceful, enticing mind of Alphonse Daudet. A southerner with the language of the cicada, we are indebted to him for some of the finest novels ever penned. He is almost a poet so much has he chosen while writing of the reality of all that is bright and cheerful. L. K. Huysmans chose the religious domain. He was a dreamer. The theories of 'Durtal,' of 'Esseintes,' his heroes, his minute analysis of architectural structures, and especially cathedral windows, his horrifying description of the sufferings of Lydwine, all go to affirm a powerful and rugged mind eminently evocative. Remote from party strife and quarrels lived Gustave Flaubert, the least literary of the group, but a noble and upright figure. How masterfully he showed up the shallowness and hypocrisy of the period and the disgust with which they inspired him. This accomplished he turned his attention to the eternal topic — the real intellectual drama — that which makes man struggle with the sentiment of the infinite. . . . Hérodias has the intuition of it before the weak vociferator Antoine in the desert; Bovary, in love. Flaubert's prose is sumptuous and sober, lyrical and comprehensive. His pupil and only disciple was Guy de Maupassant and he deviated from the principle. His art is direct but he applies it to develop everyday occurrences to suit dramatic situations without intellectual elevation. Should mention be made in this category of Jules Verne the friend of youth, the amazing and profuse storyteller who was so imaginative and prophetical? We witness today the realization of his vivid imagination. His genius consisted in gripping the reader's attention and of skilfully handling entangled situations. Octave Feuillet, aristocrat and romancier, created conventional types, non-existent to-day, but which like Balzac's characters serve a documentary interest.

The Naturalist Theatre.— It is a matter of discussion as to who instituted the Naturalist theatre. The works are no longer poetical melodramas but according to Emile Augier and Dumas the younger consist of a minute and merciless study of the bourgeois class struggling against the prejudices and barriers formed by caste. It is the aristocrat unmasked, the rehabilitation of the courtesan, the effervescence of the under world. It is a theatre somewhat poor inasmuch as it depicts uniquely an epoch and not humanity. It contains however many cleverly devised scenes and carefully handled situations. Sardou was likewise an adept in creating theatrical sensations, while his really clever historical adaptations amuse without greatly affecting us. He was the popular entertainer of the epoch for which we are grateful to him as well as to Scribe who provided the century with mirthful comedies which are always acceptable.

The Parnassian Theatre.— The Parnassians had two great representatives for their theatre: Henri de Bornier with 'Fille de Roland' and Edmond Rostand, an imitator of Hugo on a less pretentious scale and de Banville with less taste. He wrote the word finis to the romanticism-parnassian school, his enormous success 'Cyrano de Bergerac' supplying the "last rocket of the great firework display" of the century. Miguel Zamacois and René Fauchois, Jacques Richepin, André Rivoire, Francis de Croinet follow and gather here and there a few sheaves dropped by these two gleaners.

Neo-Realists.— We are now fast approaching our own days. Many of the writers cited hereafter are still alive playing an active part in literature while others have but recently died. The tree has grown and its branches have ramified losing their vigor. The schools are less determined, the parties less opposed. Effort has been made to classify them with as much clearness as possible by making the most representative names stand out from the long list at our choice. Let us begin with the Neo-Realists, direct followers of the Naturalists. Arriving on the scene at a time when the latter were beginning to lose their novelty they modified their formulæ. We find amongst this group Octave Mirabeau, passionately fond of art like the de Goncourts; he is the celebrated author of 'Calvaire,' 'Abbé Jules,' 'Journal d'une femme de chambre' and 'Jardin des supplices' which allies him to Huysmans,— misanthrope and terse,— a really remarkable writer. Next is Rosny with prehistoric evocations, both romantic and scientific — a very interesting figure. Edouard Rodzuise of a loyal mind, bourgeois instinct and strongly dogmatical ideas was a clever novelist. Paul Marguerite was less original but more representative of his epoch. He was bold enough to write 'le Désastre,' an avowed detailed and circumstantial work of defeat which, with Zola's 'Débâcle,' make the most humiliating confession of French national faults and their ransom. As a relief from these gloomy forebodings it is a pleasure to turn to Abel Hermant the large-minded Parisian with a sense of keen observation and a bantering disposition. Rightly and soundly does he tear the mask from that cosmopolitanism pedantism and all those "isms" tending to inflate bombastically society in general. His is the true French mind, his language the language of the Gauls. Franc-Nohain, more eccentric, more chimerical, is also agreeable to us for similar reasons of bantering and jesting, if at times he is a little spiteful. Assuredly less easily read but of wider scope is Paul Adam. Aristocrat, with an exuberant mind, learned and laborious he possesses a style eminently personal and evocative. His elliptical turns, powerful epitomes and delightful choice of words all combine to make a descriptive whole of the highest quality. He handles the crowd and raises above it self-willed figures of a moral and lofty mind pregnant with high ideals and of comforting solace. He wanted to comprise the entire earth in his works: he has shown us the Byzantine world, the American world, the African world, the Napoleonic epopee. But he reduces with justness all things to the unity of that thought and sentiment which guides humanity in its perpetual transition. His works are sublime containing some of the finest passages of literature of our epoch. Paul Adam is the chronicler of the modern worlds, Maurice Maindron the episodic historian of the ancient. His preference is for the 16th century. 'Saint Cendre' and 'Blancador' are imperishable types of intrepid adventurers who move in surroundings which only a connoisseur and consummate artist could choose.

The Psychological School.— The authors of this school display a realism actuating in a superior domain: that of the soul. The foremost place is held by Anatole France. Possessor of a refined mind, an erudite, a charmer, an ardent if discreet bibliophile, we wander with him from Alexandria to the Rue Saint Jacques, from Paris to Florence. He believes in nothing and takes umbrage at everything, but pleasingly so. He carries on, so to speak, the work of Voltaire, Montaigne and Rénan. Jules Lemaitre in his criticisms displays a similar state of mind, not forgetting that he was once a poet. His sharp raillery, keen sense of justice and consummate tact make of him a discreet judge who leads us gently into the confines of the soul. Paul Hervieu has drunk at the same source. An analyst of abstract problems, a morbidezza intellectual, the qualities of penetration and finesse of which temper the portrayal of the elegances and distinction of Parisian society. Amiel alone is recognized by us as a man of letters; his unique book is his 'Journal' a monumental and analytical work redoubtable in its confession of daily impotence. Nothing makes more poignant reading than this, nothing more invigorating by reaction. In addition to this he possessed a sure and incisive style which tend to render even more precious the psychological discoveries practised on his own mind. Maurice Barrès is our great living writer. Moral artist, man of action, he combines two distinct minds. Far from deploring this he rejoices in it using it to his advantage. Ironical he was the witness of our anarchy, irritable and intriguing he endeavors above all to improve his mind. Is he an egoist? Rather an egotist. The egoist's dictum is *self*, its primary and sole aim. The egotist's dictum is also self, but as a field of experience. It is the sounding of one's nature until one has discovered the inexhaustible well for sustenance. Barrès is a disciple of Châteaubriand, inheriting from him the mania of frequenting exclusive circles for the better playing of an active part in great events. He has inherited also his indeterminate reveries, his pointed pungency as a portrait painter, his sense of religion which is more esthetic than moral. The charm of his style may lie in the fact that it is slightly more vigorous than Châteaubriand's and brisker. He is like unto music. To him we are indebted for an awakening of energy and action. He influenced multitudes toward a spirit of activity, to accomplish something, to assert self. His style is the antithesis of that of Madame de Stäel. She opened the doors to foreign influence — he closed them. To him we owe those long unselfish poems 'Du sang de la volupté, de la mort,' where in harmonious stanzas he analyzes the fragrance of the Lombardian gardens, the autumnal seasons of Parme, Grenada, Venice. Let us retain his advice, so rich in thought 'Chacun doit cultiver son souvenir.' Charles Maurras is his political parent. Writer on a less grandiose scale he likewise besought his disciples to a revival of tradition, of energy and high spiritedness. His rôle was immense and we can appreciate to-day at its value the debt we owe him. Léon Daudet is his Seid. He touches on realism through his works which are more directly living. But idealogical he is more addicted to political proselytism. Paul Bourget is less conspicuous and more bourgeois. He is the woman's novelist, whom he endeavors to flatter in the matter of gossip. He interests himself in lost causes. He seeks, and what is more strange discovers, a set of rules governing life for the use of the Countess and Marquess. He is extraordinarily popular with a certain class of readers. Of a similar style is Marcel Prévost who specializes in the study of the eternal feminine. Of a lighter vein, however, and with no pretense at bragging, he alleviates the science of the heart by ingenious intrigues which are highly captivating. André Beaunier, a pupil of the normal school, the impression of which he has not been able to shake off, possesses none the less a curious mind, coupled with an incisive style, infinitely pleasing if tortuous. Romain-Rolland is the author of 'Jean Christophe.' He has set the reader a heavy task; the style is heavy and it becomes quite an undertaking to distinguish the ridiculous from the sublime. Lucien Muehfeld died too prematurely. His mind was full of promise added to a subtle and gentle style.

Colette Yver and Marcelle Tinayre have left their mark on the psychological novel. The first mentioned has recorded the sentimental deviations caused by the social obligations of the woman. It is permissible to reproach her with a narrow-mindedness of ideas the more culpable at the present time when the question of feminism is not one of discussion but of organization. Charles Henry Hirsch is a satellite of Zola and an original character. He paid perhaps too much attention to the feuilleton and his books are too long. He is a vigorous and honest writer who has not said his last word. Henri Duvernois is perfect in his light romances, resembling those of Hermant. Claude Farrère is our story teller. He commenced with material obtained from opium dreaming and ended by attaining the precision of a Maupassant. This is a pity. His interior vision is more captivating than his observations. This, however, is purely a personal opinion. His undoubted talent is beyond dispute. Leon Frapié is the friend of the children. Jérôme and Jean Théraud are the most promising writers of the coming generation. Their work, at the present moment of a noble, determined, independent, sure style, approaching that of Flaubert, already commands respect and admiration.

One of the greatest of contemporary names has been reserved for the last — Jules Renard. He is classical, psychological, realist, a poet in the noblest sense of the word. He *chooses* with subtle and sure art and defines with the precision of a mathematician. The sonority of his words is such that they sink into our mind and enthral us more than poems. His characters Poil de Carotte — distressed youth — Ragotte — old age resigned — are imperishable types of touching humanity depicted with terrible reality. Renard is a lonely soul, a misanthrope, possessing a style of his own. Charles Louis Philippe relates in an all too brief work the story of his unhappy life. Jules Dolent, realist, haughty, younger brother of Renard is like him pitilessly ironical. Wrongly understood he will in time affirm himself and his works will play a preponderating rôle. Aurel is a disciple of Dolent. His complicated style is prejudicial to the harmony of his train of thought. But his mind is so original that it is able to conjure this effort and even to enhance it.

Psychological Critics.— These are four in number, of unequal merit but all strongly impregnated with the psychological mind. Sarcy may perhaps be considered a little too superficial; Brunetière rather too heavy, while Emile Faguet and René Doumic are «très universitaire.»

Artists.—Another school arose out of Naturalism and more directly from the de Goncourts: this was styled the Artists. A primary homage is due to Péladan whose archaic science and sense of the mysterious has not been sufficiently recognized. Esthetic artist, erudite, a perfect stylist, his criticisms and novels are of the finest quality. Jean Lorrain possessed the dilatory methods and broad mind of a great man of letters. He wrote with delightful harmony ‘Princesse d'Ivoire et d'Ivresse.’ He showed himself perverse in ‘Monsieur de Phocas’ and terribly realist in his tales. He embellished by the color and rhythm of his style the most impenetrable secrets of our heart.

Pierre Loti has played a large part in literature. He has taken but a small note from the magnificent orchestra of Châteaubriand, a note morever monotonous, modulated to the infinite on the eternal theme of the tomb. He gives the impression of an ever-swaying mind, or metaphorically speaking as a sailor on the ship of life tossed perpetually on the rough sea. A great and enchanting artist. Pierre Louys is a favorite with the public, a cultured and finished artist. A Greek and Latin scholar in addition to an admirable French littérateur his works are valuable and will assuredly live. For a better understanding those writers have been grouped who have specialized in the description of the sites of France and to whom we are grateful for giving us an insight into such delightful nooks. They are named in the order of ancient to modern: Ferdinand Fabre has given us delightful pictures of the southern Cévennes; Emile Pavillon has depicted the landscape of Languedoc; André Theuriet has portrayed for us — in somewhat puerile fashion — the Champagne and Touraine country; René Bazin, Angoumois and Poitou. Anatole de Braz was a lover of Brittany. We must certainly not overlook Jean de Bonnefon, a great artist but unfortunately somewhat bitter in the use of a mind which does not lack quality. There is finally Colette (Colette Willy), perversely sentimental in her ‘Claudine’ and only sentimentally so in her other works. Her books make highly diverting and pleasant reading.

Realistic and Psychological Theatre.— These playwrights have been grouped like the writers in order to be better able to distinguish the ideas separating them. As continuation of Emile Augier and Dumas we will cite Emile Fabre, the animator of the proletarian masses, and Brieux with his risky subjects, medical or social, somewhat tardy but vigorous. Alfred Capus, Maurice Donnay, Paul Hervieu, Henri Becque and above all Porto-Riche are merely haunted by the amorous and the sentimental. François de Curel complicates his works by a predilection for individualism. He however is responsible for quite original characters which give an interest to his theatre and raise it to a higher level. Henri Bernstein is still more fearless. He attacks, like Fabre but more forcibly so, the terrible scourge of the hour: Money. He presents this scourge in all phases and gives us a terribly realistic vision of incontestable grandeur. The psychological theatre is endowed with two famous names, Courteline and Tristan Bernard. Their keen and unerring spirit of observation, coupled with a sense of the humorous not devoid of gall, have made them writers as well as dramatists, their works classics as well as modern. Their creations, drawn to life, are on a level with an Alceste or a Tartuffe and rank perhaps as authoritative. Sacha Guitry follows in their footsteps while limiting the scope of his observations to the shallow and make believe which were so deplorably prevalent before we were all tried in the fire by the present world crisis. Henri Bataille's theatre is a compromise between pure art and worldliness in general. He is at times superbly brilliant while at others he lapses into quite incomprehensible triviality not to mention commonplace. He beguiles us but not alwavs by touching upon the best traits of our race.

Realist and Psychological Historians.— Following the order of our preceding classification we will now name the historians of the two foregoing groups. Fustel de Coulanges with his ‘Cité Antique’ and his curious political papers so opportunately republished at the present time; Ernest Larisse with his remarkably clear ‘History of France’; Frederic Masson, a specialist of the Napoleonic period; Gaston Boissier, the evocator of the ancient times; Gerard Lenôtre, anecdotal, not always truthful but highly captivating in hitherto unpublished episodes of history; Pierre Nolhac enamored with Versailles and its queen, and Madelin and André Fribourg the youngest and already authorized specialists of the Revolution.

Symbolism.— We have now reached the last current which has shaken modern sensibility; its apparition however was not immediate. Like all modes of emotion and expression it is self-will that dominates mind and sensibility and conditions were not yet favorable for such a complete state. After all symbolism is merely the sign of a synthetic evolution of the race. Poesy is reminded that it once was song. Châteaubriand had announced it, Lamartine had proved it; it became necessary to formulate its rules. This musicality in the symbolists was but a tentative construction, a procedure, at most an obligation. For symbolism is a labor, labor of an excess of phrases in a void of activity. Reality deceives them, they break loose. They are impressed by Wagner, governed by Hegel. They are also influenced by the English pre-Raphaelites Burne-Jones, Watts and the poets Swinburne, Meredith and Tennyson. They looked for predecessors in the past masters, as for instance from the charming Maurice Sève of the 16th century «délie, objet de plus haute vertu.» Music is their friend, their demigod, their supreme goal. They are no longer concerned with the correct number of syllables but rather with the sonority of words and especially their individual rhythm. The greatest of the symbolists is unquestionably Villiers de l'Isle Adam. He has recreated, for a time, the mind of the élite. His mind tempered with science touches on the abstract. Tourist and poet, he is the author of ‘Axel,’ ‘Tribunat Bonhommet,’ ‘Akedisséil’ and ‘l'Eve future,’ all written with the magnificent and sure pen of the master. He has created a type of woman both voluptuous and intellectual preceding those of his epoch and which lay the foundation of a superior feminism. Stéphane Mallarmé possesses an equally noble mind but is less brilliant in execution. He analyzes, punctuates and gives a facet to all his words. He likes them for their possible sense rather than their true sense. Verlaine, in the mask of a Socrates, is one of the greatest of modern poets. He is an artist by pure instinct. Unforeseen in his brutalities and his grace, his ironical gaiety, his tenderness extending to vice — a vice terminating in remorse, are evidence of a master mind. No one has pleaded more eloquently for the relief of maimed humanity downtrodden by carnal lust. Albert Samain is original and charming, gentle, suave, sincere, the poet of the fair sex. Jean Moréas, Viollé Griffen and, above all, Verhaeren, are the enchanting songstresses of restless nature. Henri de Regnier is grand and sad. Paul Claudel disappointing but genial. André Gide disquieting and uneasy. Charles Peguy an ardent adherent to the land. Francis Jammes, the monk, and Paul Fort, the troubadour. Léon Bloy, the theological and Rabelesian poet; above all, Remy de Gourmont, whose considerable work and enlightened intellect apply to all systems; an admirable writer whose works will surely develop. André Suares, an obviously great mind; Comtesse Mathieu de Noaille, vibrant and thrilling, of an exuberant lyricism greatly captivating; Lucie Delarue Mardrus, more classical, more moderate, less genial; Jeanne d'Orliac, with her multiple and curious essays on the affirmation of a creative and commanding will; Marguerite Bornat Provins, of an amorous lyricism, whose 'Livre pour toi' is the model of a task accomplished. Finally, Charles Demaye and Henri Franck, whose early demise is ever to be regretted. They have both left masterpieces; the former, 'Le Livre du Désir'; the latter, 'La Danse devant l'Arche.'

Symbolist Theatre.— Claudel is the great pontiff. His 'Annonce faite à Marie,' a play in a mysterious vein, is, in its archaic form, a disturbing vision. 'L'Otage,' a deeper work, less æsthetic, more closely resembles a superior piece of realism. Maurice Maeterlinck has endowed the theatre with that engrossing and always disturbing theme consisting in the portrayal of the mysterious sides and moods of man; masterpieces indeed are his chaste and profound dramas in which every word tells. Henri Gheon is responsible for 'Le Pain,' a powerfully-composed work; and H. R. Lenormant writes desponding and disconcerting plays. J. d'Orliac, with 'Pulcinella' and 'le Chiffonnier,' affirms the right of the picturesque and irony in tragedy.

The Future.— What will be the literary future of France? With the war a generation has died while another is springing up. We have followed the sinuous line of French thought from 1800 to the present time. Born directly after the Revolution it is like that animated with an inspiration of gaiety and is powerful. It feels it has a mission to accomplish, i.e., to bring to humanity — liberty, deliverance. Romanticism clamored for liberty; political errors deceived it, difficulties arose in 1848 continuing to 1870. The war, defeat, humiliation are accepted. A generation then arose, the naturalists, seeing only the gloomier aspect of life, ceding the place later to the symbolists. A reaction finally sets in. Two schools rise in opposition to each other; on the one hand is Charles Maurras and his followers of the *Action Française* championing the cause of the royalists, on the other the young school of the *Rappel* and *Foi et Vie* favoring the revolutionary tradition, both ardent and enthusiastic. The present world crisis arrives and unites them in a common ideal, that of showing to the world at large the real rôle of France which is to save civilization. This is the basis for a new school. Gaston Riou in his magnificent work 'aux écoutes de la France qui vient' has already formulated it.

The awakening had already been prepared by the *félibrige*, that is to say, the grouping of the Provençal poets desirous of reviving their local language and customs on the point of being forgotten or swept away. Mistral, our great Mistral, is the indefatigable leader and champion of this reactionary spirit. All honor to this illustrious and noble figure so passionately fond of his country.

Among the rising generation a choice is difficult. Of the classic writers we have Abel Bonnard and Léo Larguiez, Cécile Sauvage, André Lafon, Drouot, Charles Dumas, some of whom, alas! are inscribed on the roll of honor — *pro patria mori!* There are the dilettante elegant writers like Vaudoyer and Henriot, the delightful belated adolescents Jean Cocteau, Maurice Rostand and Géraldy. There are the authors of free verse such as André Salmon and Canudo, Guy-Charles Cros, Fernand Divoire; Jules Romaine, the founder of unanimism; Chenevière and Duhamel, impressed by Walt Whitman; Porché whose 'Arrêt sur la Marne' denotes an ardent and rich temperament. Max Jacob, Reverdy, Cendral are incomprehensible and complicated in their simultaneity, but make their presence felt with their Montparnassian school. Finally there is Spire, replete with bitterness and Israelitish irony. Of all these names which ones will establish themselves? It is of little import. Time will show. One thing is certain that all will spare no effort in making an even greater nation of their beloved and eventually victorious France!

JEANNE D'ORLIAC,
Poet and Dramatic Author; Author of 'Grand Blessé.'

15. FRENCH DRAMATIC ART. Dramatic art occupies one of the foremost places, probably even the first place, in French literature. If, as has been said, the Frenchman "n'a pas la tête épique," it is none the less certain that he has a predilection for drama. To-day, as in the past, he is passionately devoted to his theatre, and French plays are more than ever translated and produced throughout the world.

Evolutions of the French Theatre.— There are six principal periods in the evolution of the French theatre:

1. *The Middle Age.*—This was the tentative and experimental period. Dramatic art was rudimentary, allegorical and coarsely realistic in general. Despite the number and diversity of its productions it has left no remarkable work of a durable nature.

2. *The Renaissance.*— From the end of the 15th century to the beginning of the 17th Greco-Latin culture became more widely disseminated and the knowledge of ancient Greek and Roman literature engendered a taste for the classics. We were still in the experimental period, but poetical expression improved and tragedy made its appearance.

3. *The Classical Era.*— This marked the zenith of dramatic art in France. In it was discovered the mode of expression best harmonizing with the genius of the nation, which approached perfection in the great tragedies of Racine and Corneille, and in the foremost comedies of all times, those of Molière.

4. *The Eighteenth Century.*— This represented for the theatre, as it did for political and social life, a transitory era. The literary output was poor, tragedy became inextant, comedy was transformed and diversified; and drama first made its appearance.

5. *The Romantic Period.*— This marked a renaissance in dramatic art which was decidedly brilliant but ephemeral. The theatre became epical, lyrical, even philosophical. The attempt had been a bold one but ended in failure.

6. *The Realistic Period.*— This dates from the end of the last century and still predominates in the French theatre. The period was characterized by a return to nature, and to the portrayal of contemporary life and customs.

I. THE MIDDLE AGE.

The French theatre originated from two distinct sources and from its inception has been developed in two different directions. On the one hand, the religious theatre, with its *miracles* and *mysteries*, was a natural development of the simple religious ceremonies; while the profane or secular theatre, of more humble origin, found its setting in the farcical exhibitions at fairs and the vernacular of strolling players.

The Religious Theatre. *Origin (from the 5th to 14th Century).*— The Church may be regarded as the first theatre. It was the only exhibition offered to the public during the early centuries. In order to attract the people the priests introduced variety into their services. They began by adding to the liturgies certain developments known as *tropes* (or metaphors). These were followed by religious chants, by psalms, as solos, and then the choir. Finally, for the celebration of religious festivals, simple dramas were composed, with a rough staging: for instance, at Christmas, the Manger, the Virgin and the Child, the Ass and the Ox, the Three Wise Men of the East; at Easter, the Holy Women at the Tomb of Christ. Emotion was aroused both of a religious and theatrical nature, by striking the imagination and appealing to the visual as well as the oracular senses.

Up to the 12th century drama was played in churches only, at which time it left them. Devout laymen, organized into a brotherhood, erected a sort of stage on the spaces round the churches, and on the public highway. Complicated scenery represented at one and the same time Heaven, Earth and Hell. Everything was confused. In the production of 'Adam' there parade, in turn, God in a long white cloak, Adam in a red tunic, Eve in a white robe. Then we have Satan and the demons and the prophets of Israel. In the 13th century, Jean Bodel produced at Arras the 'Jeu de Saint Nicolas,' wherein a crusade is presented. We are transported successively from a Turkish palace to a Picardy tavern, from a battlefield in Palestine to a common prison. No distinction is made either in epochs or customs. Tragedy intermingles with comedy, and the purse-snatchers of the Rue Vide Gousset rub shoulders with the Mohammedan.

These crude plays were followed in the 14th century by the 'Miracle.' This was a complete and lengthy drama which owed its title to the fact that the dénouement always lay in the miraculous intervention either on the part of a Saint, of God, or more particularly, the Holy Virgin, the latter appealing to popular imagination. There was much scenery, the plot was complicated and called for a large number of executants.

There exist 40 'Miracles de Notre Dame.' They are complete plays, fairly well arranged and containing not more than 1,000 to 3,000 verses. They ignore both unity of time and unity of place, but they do observe unity of action. The dramatic interest is generally sustained.

Les Mistères.* *(15th and 16th Century).*— The same thing cannot be said of *mystères*, or more correctly *mistères* (from *ministerium*, signifying action, drama, and not *musterion*, a mysterious thing). These are works of exaggerated length, many parts of which have little apparent relation to the whole. 'Le Mistère du Vieil Testament' contains 60,000 verses, 'le Mistère de la Passion,' by Gréban, 35,000, and 'les Actes des Apôtres' more than 50,000. Their performance lasted several days, sometimes weeks.

The subject is almost exclusively taken from the Scripture. There exist, however, a few secular *mistères*, such as 'le Mistère de Troie' (1463), 'le Mistère du Siège d'Orléans' (1439). But even these are religiously inspired and were performed "in honor of God for the instruction of the poor."

The entire population participated in the preparation and organization of a *mistère*. There were no professional actors to play these numerous rôles, sometimes as many as 100, 200 or even 500, in addition to a host of other figurants. The corporations and the brotherhoods supervised the enterprise. The most celebrated brotherhood was the *Confrérie de la Passion*, organized in Paris at the end of the 14th century, which had the monopoly for *mistères* as regards the capital, and continued in existence for 250 years. The actors, nearly all giving their services free, were recruited from every class of society: artisans, commoners and even priests; the rôle of Christ was always chosen from among them. Women only played mute rôles, at any rate at first, the female characters being impersonated by young men. Performances were announced several weeks in advance by means of a *cry*, i.e., a solemn proclamation. An imposing procession, preceded by trumpeters and including the actors, arrayed in gorgeous costumes, paraded the town collecting alms and recruiting the figurants or parties playing secondary rôles. The stage, which was very large, with a width of from 30 to 50 meters, showed several scenes in juxtaposition: a house, a church, a forest, a cavern. Paradise was represented by a loggia erected at the back of the stage, and Hell by a sort of cavity arranged in the place which is now occupied by the prompter's box, from which the demons rushed out on to the stage.

Everything was arranged with a view to striking the imagination; flames escaped from the jaws of Hell, drums were beaten and claps of thunder were heard. By mechanical means, angels were shown descending from Heaven, and the «damned» disappeared through trap-doors. Scenes were shown of torture, crucifixion and decapitation. It was a highly realistic performance and as bold as it was simple.

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* Name given in the Middle Ages to plays dealing with religious subjects wherein are found the intervention of God, the saints, the angels and devils.

These plays on a prodigious scale were absolutely incoherent, they took the form of a review of the acts of men, saints and demons. Comedy continually intermingled with tragedy. The devil was usually represented as a kind of buffoon or big booby, flouted and beaten to the great delight of the spectators. It must be borne in mind that these simple-minded people had to be supplied with plays suited to their particular mentality. Their emotions required variety. They would weep at the sufferings of Christ, but shake with laughter at a coarse farce or a drunken brawl in a disreputable gaming house. After a mystical oration they expected, and often demanded, licentious and even obscene entertainment.

Performed with the object of pleasing the populace, the *mistères* possessed all those defects inherent to pieces created for popular consumption, eventually descending to the level of common melodrama or farce. They were almost altogether devoid of artistic merit and the rare poetical passages they contained could not save them from well-deserved oblivion. These dramatic poems, quite inferior to the *Miracles* of the 14th century, contain practically nothing of interest to the modern reader. They had an enormous success at the time and they retained their popularity until about the middle of the 16th century, but their coarse humor, which approached the sacreligious, ultimately alarmed the Church, and by a decree of the Paris Parliament, voted in 1548, they were suppressed in the capital. They survived a few years longer in the provinces but finally disappeared. Public taste, which had been influenced by the Renaissance, demanded art of a more refined character.

The Secular Theatre. *Origin (from the 11th to the 14th Century)*.— The secular theatre — wrongly styled the comedy theatre inasmuch as all subjects are treated by it except those which fell into the category of the *miracle* or *mistère* — is of very humble origin. It originated more particularly from those strolling players who peddled their wares from town to town in the shape of tales, monologues, disputes and debates. Traces can also be found of the influence of the ancient Greek and Roman theatre, known vaguely to the university scholars. The first works with which we are acquainted are ‹le Jeu de la Feuillée,› and ‹le Jeu de Robin et de Marion,› both by Adam de la Halle, the former produced in 1262 and the latter about 1285. The first play reproduces with a fair amount of spirit the adventures and misfortunes of the author's life. The second, of quite a different character, is a pastoral play, a kind of comedy-ballet interspersed with songs wherein is related the simple story of a shepherdess who prefers her shepherd-lover to her Seigneur. This play, as has been rightly stated, is the first of our comic operas.

No comedy has been handed down to us from the 14th century, but we find a play with the title ‹Histoire de Grisélidis,› a sentimental story of a wife unjustly condemned and deserted by her husband but to whom justice is finally rendered. It contains some passages of exquisite tenderness, as, for instance, that in which the forsaken wife begs her husband to treat his second wife less harshly than he dealt her: more frail and more «delicately nurtured» she cannot «suffer as I have suffered.»

Merrymakers Clubs (*Les Sociétés Joyeuses*).— In the 15th century considerable interest in comedy was revealed in plays of a satirical, moral and farcical nature. Numerous amateur clubs supplied the actors, the most important being ‹la Basoche› and ‹les Enfants sans souci.› The Basochians were clerks to the attorneys attached to the Paris Parliament. They formed an important corporation which elected its king, and every year, in spring and July, played farces and moralities at the Palais de Justice. The Enfants sans souci, or *Sots*, were young men of good family, having literary and artistic tastes. They were arrayed in green and yellow like the Court Jesters. At their head was the Prince of Sots, assisted by Mother Sot. They played what were called *Soties*, a kind of satirical comedy or revue with a contemporary tendency.

The Moralities.— The morality play was less a comedy than a drama, or rather a melodrama. Its characters were allegorical: Hope, Faith, Pity, Wealth, Poverty, the Prodigal Son, the Ungrateful Child. Like all self-respecting melodramas, these morality plays always punished vice and rewarded virtue; as for instance the greedy son who offers his father a piece of coarse bread while reserving for himself a succulent pie, but this pie when opened contains a toad which jumps out, striking the boy in the face. Or again, in the ‹Condamnation de Banquet,› Banquet, in the person of Gluttony, is condemned to be hanged by Diet.

The Soties.— If the morality plays were pedantic and morose, the Soties were alert and realistic and the dialogue satirical. The plot, based on a feint, permitted great liberty of treatment; the characters were all represented as being mad, the dialogue was free and easy. The Prince of Sots took the rôle of King Louis XII, mad, Mother Sot impersonated the Holy Mother of the Church, mad. The community was also represented as mad, or *Sotte Commune*, the soldier, *Sot Glorieux*, the merchant, *Sot Corrompu*, the woman, *Sotte Folle*.

All the eccentricities and abuses of the epoch were criticized. The voluminous works handed down to us by the Sotie plays furnish us to-day with the record of a period when journalism did not exist.

The Farces.— The morality and sotie plays quickly disappeared but the farce remained. We find it in all our later day comedies, especially those of Molière. It expresses the French, or rather Gallic, temperament and finds its embodiment in that hearty laugh so dear to Rabelais «pour ce que rire est le propre de l'homme» («laughter belongs to man»). Nothing escapes it, everyone and everything is subjected to its raillery and wit: commoners, soldiers, the clergy, tradesmen. But its animated spirit and biting humor, which never fear to employ the right word, coarse or not, are above all reserved for matrimonial affairs and domestic wranglings. In these farces we are shown the husband, flouted, beaten, deceived by his wicked wife . . . against whom he is revenged. In the 'Farce du Cuvier,' the husband is little more than a slave; his wife has drawn up a list of tasks he is to perform: sweep, draw water, buy the provisions, look after the brat of a boy and a host of other things. But one day it so happens that our good wife falls into a tank and to her supplications for help the husband merely replies "That isn't on my list."

We are indebted to the farce plays for a really artistic piece: 'Patelin.' Here we are shown the biter bit. A crafty lawyer wins a suit for his client, the shepherd Agnelet, who, before the jury, pretends to be an idiot and whose replies consist in the one word "Bé." When the lawyer comes to collect his fee, Agnelet merely keeps on repeating his "Bé" and the man of law is obliged to depart without a sou. The plot is amusing and the characters, cleverly played, make it a forerunner of true comedy.

But 'Patelin' is an exception only, and, on the whole, the prolific output of the Middle Age is condemned to sink into oblivion. This unrefined public clamored for amusing actors and not real artistes. Chance did not bring to light among all these anonymous authors the man of genius, the Shakespeare or the Lope de Vega who would have developed dramatic art in France in the same way they did for the English and Spanish theatre. The change did take place but by a return to antiquity. The French spirit ever seeking lucidity and method could only reach its true goal and only produce works of art by taking a leaf out of the literary perfections of the Romans and especially the Greeks.

II. The Renaissance.

After the prolific but sterile productions of the Middle Age, we now enter a rather short transitory period not extending beyond three-quarters of a century, i.e., the second half of the 16th and the first years of the 17th. Nothing remarkable stands out in this period and it did not produce any masterpiece, but it is of great importance, marking as it does a real revolution in dramatic art. Thanks to the humanists, whose minds had been elevated by a closer acquaintance with Homer and Virgil, dramatic art was of a more refined character, the language richer, and the colored but confused realism of the Middle Age was succeeded by classicism, undoubtedly poorer but certainly of a more finished quality, the real perfection of which moreover was not to be attained until a later period which was felt to be imminent. The 16th century was creating the instrument with which the 17th century would write masterpieces. We here witness the birth of tragedy, which has no precedent in France, being directly inspired from the ancient literature, while comedy for a time is eclipsed. In the 16th century we find the founders and pioneers of dramatic art.

Tragedy. *Origin.*— The populace always took delight in the old sotie, farce, morality and mistère plays, but literary men had already conceived a form of art of a higher tone. Emulating the Italians, the humanists of the colleges composed Latin tragedies, played by the pupils before their professors and fellow students. 'La Jephté' by Buchanan was a great success at the College de Guyenne. Italian tragedies, such as 'Sophonisbe' by Trissin, adapted by Mellin de Saint Gelais, were also translated and played under the same conditions. To these should be added translations of some of the ancient works, such at 'Electre' and 'Hécube' by Lazare de Baif, 'Iphigénie à Aulis' by Thomas Sibilet. These were not, however, original works in the French language. The first *French* tragedy was 'Cléopâtre' by Jodelle, played in 1552 at the Hotel de Reims before Henri II. This is a date to be remembered as it marks the appearance of a new style.

It was undoubtedly tragedy in the true meaning of the word, the study of a moral crisis, treated just prior to its close and culminating in the death of the hero. The work was clumsy and confused but this is not of great importance. We are shown Cleopatra, after the death of Antony, discussing with Octavius, deliberating with her confidants, hesitating before taking a decision, finally deciding and then killing herself. This was the commencement of a psychological development of a character in a tragic situation, in fact a domestic drama transported to the stage. It was tragedy itself.

Among the successors of Jodelle, two really talented authors should be mentioned: Robert Garnier and Antoine de Montchrestien. The masterpiece of the first named was 'Les Juives' (1580), a spirited work which paved the way for Racine's 'l'Athalie.' Garnier, although a fine orator, was too verbose. He lacked taste but his style was vigorous. Quite different was Montchrestien. Elegiac and gentle, the real poet with a melancholy tendency. In sensitiveness he resembled Racine and sometimes even Lamartine. His works include 'l'Ecossaise' (1605) where we meet the unfortunate Marie Stuart.

Tragedy of the 16th century like that of the 17th obeys "the three unities."* But it was dull and declamatory, and contained lyrical parts and choruses which, however, disappeared later. More pathetic than dramatic, it left its mark on poetry rather than the theatre. The first years of the 17th century mark a step backward rather than forward. Once again the different styles become confused. The best-known author was Alexandre Hardy, the officially appointed playwright to the "Grands Comédiens de l'Hotel de Bourgogne." He was indefatigable, turning out pieces by the hundred: comedies, tragedies, romantic dramas, popular pieces and pastoral plays. He understood the theatre and knew how to create a dramatic situation, but never troubled about art, merely aiming at making money. 'Bergeries' by Racan, might also be mentioned which was a very delicate pastoral play; 'Pyrame et Thisbé' by Théophile de Viau, a masterpiece of bad taste, which has become immortalized by the two ridiculous lines:

"Le voilá ce poignard qui, du sang de son maître
S'est souillé lâchement; il en rougit le traître!"

("See this dagger, basely stained with the blood of its master; it blushes, the traitor!")

and 'Sophonisbe' by Mairet where, for the first time, the Aristotelian rules were strictly observed. A man of genius only was missing, and he will be revealed to us later in 'Le Cid' (1636).

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* Note by translator — the three unities in the Drama are: time, place and action.

Comedy.— The transformation was less marked than for tragedy. There was evolution rather than creation, properly speaking. *Farce* combined with *Morality,* and we witnessed, under Italian influence, the comedy of intrigue with its artificial and complicated imbroglios its conventional and stereotyped figures of wily valets, dishonest servants, bullying assassins and innocent and coquettish maidens. At the beginning we find a few poetical works, 'Eugène' by Jodelle, played in 1552 after his 'Cléopâtre,' 'la Trésorière' and 'Les Esbahis' by Jacques Grévin. These were merely farces, amusing in a coarse and rough sense. Pierre Larivey, a direct descendant by his father of the Giunti, the famous printers of Venice, introduced into France the Italian comedy. Everything was of foreign extraction, the plot, dialogue and the different characters. The style alone was original, the language spirited and colored. It will be seen later that Molière borrowed quite a lot of ideas from this theatre, notably in 'l'Avare' where Harpagon losing his cash-box appears to be inspired by the miser in Larivey's piece 'les Esprits' who has been robbed of «sa chère bourse.» This is not much, but it is practically all worth mentioning. Toward the end of the 16th century, tragical-comedy and pastoral plays replaced comedy proper. The latter was not revived until 1629 with 'Mélite' by Corneille.

III. THE CLASSICAL ERA.

We have now arrived at a glorious period in French dramatic art, in which it reaches its zenith. It is incarnated in three great names: Corneille, Racine and Molière. The two first mentioned have immortalized tragedy. The latter is the undisputed master of comedy not only in France but throughout the world. Molière did for comedy what Shakespeare did for drama. In order to understand this period it is not sufficient to study the works only, it is above all necessary to understand the nature of this classicism and the part it plays in French dramatic art.

Classicism in the French Theatre. *Character of Classical Art.*— The classical mind, defined by Malherbe and confirmed by Boileau, possesses a certain number of essential traits which have a direct bearing on dramatic art, and more especially in regard to tragedy.

Classical literature emulates the ancient authors. But this does not mean a mere servile copying of the works. Masters are looked for rather than models; these ancient works furnish themes which can be developed and subjects which are capable of expansion. For example, the Roman historians, Tite-Live and Tacite, the epical poets, Homer and Virgil, the great tragedy writers Sophocles, Euripides and even Sénèque, afforded inspiration to Corneille and Racine in most of their tragedies.

Classical literature is governed by reason. In this it admirably suits French genius with its lucid and enlightened mind. This faculty of reasoning power restrains and disciplines the imagination and sensibility without in any way suppressing them.

Classical literature follows nature. Therefore it avoids allegorical subjects, abstract ideas and symbols so inherent to the theatre of the Middle Age, and which we shall find in the works of the romantic writers. Classical literature portrays individuals and humanity in the supreme moments of passion or self-assertiveness. It is psychological, devoted to the analysis of the intellectual and moral faculties, to the observation and development of the decisions they provoke. It is not descriptive and does not concern itself, to any great extent, with local color; neither physical nature nor the customs of society interest it. It only recognizes concrete man, resolute and active. It is not pathetic and does not endeavor to excite emotion without appealing to intelligence.

As classical literature obeys the laws of reason and nature it therefore follows that it respects the rule of the three-unities: (1) *Unity of Place.*— It is not in the nature of things that a drama which is limited as to time should lead the actors and spectators to the four corners of the world. (2) *Unity of Time.*— It is unnatural that a violent crisis occasioning a tension of the entire being should last years, months or even days; it must be confined to a few hours. (3) *Unity of Action.*— Above all it is absolutely unnatural for the interest to be scattered over a multiplicity of disconnected episodes; it must be concentrated on a single action. In this connection we cannot do better than quote Boileau's famous precept:

> "Qu'en un lieu, qu'en un jour un seul fait accompli,
> Tienne jusqu'à la fin le théâtre rempli."
>
> ("That but one accomplished fact in a place or a day,
> Holds the theatre filled unto the end ")

It will be seen that it is the exact opposite of the diversified and confused art of the Middle Age, which, in its interminable plays, paid no attention to time, place or action.

Finally, classical literature required a distinction to be made in the different styles: tragedy, a noble style, and comedy, a popular style, thus forming two distinct spheres separated by an impassable barrier. This is yet another difference distinguishing it both from the art of the Middle Age and that of the Romantic period. It now remains to be seen how, on such lines France was able to produce in the 17th century such perfect, if not the most vigorous, works in dramatic art of modern times.

The Classical Tragedy.— The date 1636 is unique in the annals of the French theatre. The appearance of 'Le Cid' by Corneille marks the birth of a new dramatic art. This young poet, born at Rouen in 1606, had already made himself known by a few pleasant comedies which will be referred to later, and by a tragedy, 'Medée,' gloomy and confused but which, nevertheless, was not devoid of beauty. Nothing however, in his first works could lead anyone to suppose that this was the author whose genius would be revealed later in 'Le Cid.' The piece had a phenomenal success. «Tout Paris pour Chimène a les yeux de Rodrigue» («All Paris sees Chimène with the eyes of Rodrigue»), wrote Boileau. For the first time we now leave melodrama with its sensational features and improbable situations. Here we have no need to rely on outward show, the plot itself being of sufficient interest. Characters are now seen acting in harmony with their feelings — the events represented are of their own volition, and even when such characters are the object of these events the will of the actors predominates. The characters create the situation represented and the latter is subordinate to the former. Interest is fixed on the heroes for the simple reason that they are the living embodiment of the rôle they play and we are able thus to follow them feelingly throughout the whole piece. The *psychological* theatre was created.

What do we find in ‹Le Cid›? A conflict between love and duty in the souls of Rodrigue and Chimène. To avenge his honor, Rodrigue kills the father of his beloved and Chimène «to uphold his glory,» demands the death of her adored one. We suffer with them because we act and feel with them. Masterpiece after masterpiece follow. They are always in the nature of moral conflicts wherein mind triumphs over difficulties. In ‹Horace› (1640) we have a conflict between patriotism and family ties. In ‹Cinna› (1640) the conflict is between a spirit of vengeance and forgiveness. In ‹Polyeucte› (1643) between human and divine love.

Numerous other tragedies followed, too numerous in fact to immortalize the poet's glory. They marked a falling off in quality and finally the decline of his genius. There are, however, many beautiful passages in ‹Pompée› (1643), ‹Rodogune› (1644), ‹Heraclius› (1646) and especially ‹Nicomède› (1651) which has been regarded as one of his great masterpieces.

The most striking thing which appeals to us in Corneille is the rôle he attributes to Mind and Reason, which invariably triumph over passion. All his heroes by a superhuman effort take upon themselves the accomplishment of a duty which breaks their career and ruins their hopes. A thousand obstacles stand in their way and a thousand times they are surmounted. All, before accomplishing a painful task, are ready to say like Pauline in ‹Polyeucte›:

> *"Il déchire mon âme et ne l'ébranle pas."*
> ("It may shatter my soul, but not shake it.")

All, after having accomplished it are ready to repeat with Rodrigue:

> *"Je le ferais encor si j'avais à le faire."*
> ("I should do it again if I had it to do.")

Love never has the ascendancy over virtue in this theatre, which La Bruyère and Voltaire unanimously qualify as sublime. It has been said rightly of Corneille's theatre, «qu'il était une école de grandeur d'âme,» («It was a school of the grandeur of the soul»), and it is not difficult to understand the words used by Napoleon, who if anyone understood human nature: «La France doit à Corneille une partie de ses belles actions» («France owes part of her fine deeds to Corneille»).

Of quite another school was «Racine the tender.» La Bruyère draws a comparison of the two in these terms: «Corneille portrays humanity as it exists, that is to say, real; whereas Racine depicts man in his conception of all that to which man should attain, i.e., an idealistic state of humanity.»

The difference may be explained by circumstances. From 1636, date of the first performance of ‹Le Cid,› to 1667 when ‹Andromaque› made its début, more than 30 years had passed and the new generation in no way resembled the old. Where do we find those sturdy companions of Louis XIII to whom honor was the salt of their life? Who would recognize them in the insipid and powdered marquesses of the court of Louis XIV? The noble ideals inspired by Corneille no longer sat well on the shoulders of these spoilt and sickly puppets. Love with all its weaknesses seduces them much more than the exaltation of will dominating passion. Racine, so well versed in the knowledge of human nature, supplies their demands. Born in 1639 he was educated by the Jansénistes of Port Royal and he was indebted to the early training he received there for the refined culture to which he attained; he read both Latin and Greek in the original. He learned from his masters the doctrine of predestination, and that without the aid of Providence humanity cannot hope to triumph over passion. His heroes, and above all his heroines, are the unconscious and innocent victims of a fatality against which their will revolts in vain.

After two of his earlier works, brilliant but somewhat empty, ‹la Thébaide› (1664) and ‹Alexandre le Grand› (1665), Racine asserted his personality in his first masterpiece ‹Andromaque› (1667). In this piece we meet love which is stronger than death, fidelity lasting beyond the tomb, conjugal love stronger than maternal love, the child almost sacrificed to the memory of its father. And next to this exquisite figure «Andromaque aux bras blancs» we have the tortured, jealous, desperate love of a Hermione or an Oreste. In ‹Britannicus› (1669) we are shown the ambition of an Agrippine struggling against the tyranny of a Nero. But Racine quickly reverted to his favorite theme, as witness ‹Bérenice› (1670), a delightful elegy, a study of unrequited love; ‹Bajazet› (1672), a drama of the harem with all its voluptuousness; ‹Mithridate› (1673), the story of the jealous love of an old man and the chaste love of his young and sorrowful fiancée; ‹Iphigénie› (1673) deals with the innocent love of the maiden; and in ‹Phèdre› (1677) we have the culpable, incestuous love which is passion in all its fury.

At this time, Racine, in the zenith of his glory, forsook the theatre at the age of 37. He married, reverted to the Christian religion, and this great passionate master became transformed into the best of husbands and fathers. It was fated, however, that he should bequeath two more works to the theatre, though after an absence of 12 years and under very different conditions. At the request of Madame de Maintenon he composed for the young ladies of Saint Cyr two religious tragedies with choirs, ‹Esther› (1687) and ‹Athalie› (1689), a work which is unique for its purity and vigor. Voltaire saw in it «le chef d'œuvre de l'esprit humain» («the masterpiece of the human spirit»).

As we have pointed out, Racine was the very antithesis of Corneille. He portrayed to us the mind wandering at random, abandoning itself to its destiny, the latter being to love and die for love. All his heroes might repeat with Oreste: «Je me livre en aveugle au destin qui m'entraine» («I yield blindly to the fate that impels me»), and all his heroines echo with Phèdre: «C'est Vénus toute entière à sa proie attachée» («It is Venus entirely fastened on her prey»).

Racine's art is unrivalled. His poesy is as sweet and melodious as music and colored as a painting. His imagination, of a marvelous richness, evokes the splendors of a fête in Imperial

Rome, or the horrors of: «. . . . cette nuit cruelle qui fut pour tout un peuple une nuit éternelle» («. . . . that cruel night which was an eternal night for a whole nation»).

If it is borne in mind that he used the simplest methods, that his tragedies contained as little matter as possible, and that he excelled in creating «something out of nothing,» it is not difficult to understand Voltaire's unstinted praise and his preference for «the perfect tragedies of Racine» to the «sublime scenes of Corneille.» Voltaire has employed the right epithet: In Racine we find perfection.

Besides these two illustrious names all others pale. We might, however, cite Thomas Corneille, 20 years his brother's junior, who possessed a vapid and romantic talent, and above all, Rotrou, of an original imagination with occasional flashes of genius. His ‘Saint Genest’ is a weird Christian tragedy, wherein the hero, a comedian, becomes a martyr. Pradon is known only by his ‘Phèdre,’ written with the special object of discrediting Racine's work of the same name, and Quinault, the tamest of tragedy authors, is more famed for his numerous operatic compositions. Hereafter tragedy may be considered as dead. Voltaire and Crébillon, in their brilliant but factitious works, endeavored to give it an appearance of revival, but at the end of the following century it disappeared entirely from the stage.

Classical Comedy.— In the 17th century it may be said that comedy is incarnated in one name, but what a name: Molière! The greatest name in dramatic art after Shakespeare. It would, however, be unjust to overlook certain other authors among his predecessors, contemporaries or successors.

In the first place, we have Corneille. He made his début with the three following light comedies ‘Mélite’ (1629), ‘La Place Royale’ (1634) and ‘L'Illusion Comique’ (1636). In 1643 ‘Le Menteur’ appeared, which was the first character comedy given in France before Molière's plays, and in 1644 we have ‘La Suite du Menteur.’ Scarron, with his burlesque comedy ‘Don Japhet d'Arménie’ (1644), and Cyrano de Bergerac, with ‘Le Pédant Joué’ (1654), furnished certain elements from which our great comedian gleaned a few ideas, for he never made a secret of the fact that he «adopted ideas wherever he found them.» Furthermore, the Italian comedies played in Paris supplied him with ready-made material for plots and topics on which he could exercise his genius.

Jean Baptiste Poquelin, called Molière, a native Parisian, was born in 1622 in the shop of an upholsterer to the king, situated under the columns of a densely populated middle-class quarter of Paris. He rubbed shoulders from his childhood with those who were later on to figure in his works. When still very young he founded, with a few friends, the Théâtre Illustre; the troupe led a precarious existence in Paris and drifted to the provinces. Molière was the guiding spirit, manager, actor and author. At the beginning he merely composed a few farces, crude sketches on the lines of the Italian theatre in which the actors suited the gests and words to their own fancy. He returned to Paris in 1658 and thereafter led an exceedingly strenuous life. His literary output was prodigious and he composed his works, even his masterpieces, in feverish haste, often on the order of the king who commanded his troupe to play at Versailles. In the meantime, he married one of his actresses, Madeleine Béjart, pretty, coquette and 20 years his junior, on whose account he experienced great suffering. Finally, worn out and broken by the intense life he led, he died on the stage while playing in his piece ‘Le Malade Imaginaire’ (1673).

Molière possessed extraordinary activity, writing, producing and playing more than 20 works of varying length and unequal value. The most important were ‘Les Précieuses Ridicules’ (1659), a satirical comedy of the manners of the day; ‘L'École des Maris’ (1669) and ‘L'École des Femmes’ (1662), a biting criticism of the badly matched husband and wife; ‘Tartufe’ (1664), wherein he attacks religious hypocrisy; ‘Don Juan’ (1665), a work of a curious and exciting nature; ‘Le Misanthrope’ (1666), wherein Alceste's uprightness makes him the victim of the perversities of Célimène the Coquette; ‘Le Bourgeois Gentilhomme’ (1676); a portrait of the parvenu; ‘Les Femmes Savantes’ (1672), an outspoken attack on pedantry.

Molière's theatre is a world in itself. Although his output is smaller than that of Shakespeare, he introduces us to all classes of society: nobility, the masses, country yokels, people of all ages and conditions. And all are handled with consummate skill. A Jourdain, a Tartufe or a Célimène are types that are imperishable. What then was Molière's secret? Quite a simple one, consisting merely in «painting after Nature.» And painting what? «The people of his day.» Action and plot count for little. He devoted himself primarily to life and character. In the portrayal of his characters, Molière followed the psychological style of Corneille and Racine, and in portraying life or customs, while retaining the scene and satire of his epoch, he showed a predilection for the social side of life. Molière was gifted with a remarkable talent for observation, which earned for him from his contemporaries the nickname of «the Contemplator.» The ridiculous, the eccentric or the vicious, nothing escaped him. His characters are life-like because they have been drawn from actual life. Who has not met his Tartufe: «Gros et gras, le teint frais et la bouche vermeille» («Big and fat, fresh complexion and red mouth»), or the good-natured and easy-going Chrysale who: «Aime fort le repos, la paix et la douceur,» to say nothing of Jourdain, suffering from that mania for wild extravagance («la folie des grandeurs»); or Argan, the imaginary invalid but in reality as strong as a bull and who is doomed to die from an apoplectic fit; Toinette, the shrewd, loud-spoken domestic servant. These can scarcely be called caricatures, Molière simply exaggerated in a slight degree certain traits to suit theatrical limelight. His characters are always actual life-studies depicted from personal observation.

After all, comedy is merely a cloak to mask the seamy side of human nature. All these comedies are in reality dramas. It is life, and life is sad and hard for the virtuous, while facile for the unscrupulous. Take Tartufe, a religious hypocrite pretending to be righteous, who divides and upsets a happy and respectable family; or Alceste, the very type of honor and loyalty, who is deceived by his friends and betrayed by his mistress. Again, Harpagon, the avaricious father of a prodigal son and a frivolous daughter who forsakes him. A Trissotin, of intellectual disposition in quest of a large marriage portion, dangling before the eyes of the narrow-minded mother his social status and profiting by the moral cowardice of the father, to marry a charming girl only to make her the most unhappy of women. If, to respect traditions and in order not to trick the spectators, Molière had furnished his pieces with their logical dénouement, they would all have had an unhappy ending; honest folk would have been ruined by clever rogues, households divided and every home in misery. Musset rightly summed up Molière's style in the following words.

> " Cette mâle gaieté si triste et si profonde
> Que lorsqu'on vient d'en rire on en devrait pleurer."
>
> (" This manly gaiety, so sad and so deep,
> That when one laughs at it, one must weep").

And yet despite all this, Molière remained optimistic, and if he made war on all these abuses, eccentricities and vices it was because he honestly believed it was possible to remedy them. He desired to bring man back to nature and common sense.

In those two expressions, nature and common sense, we have the whole of Molière's character, and in his way of thinking one was the logical sequence of the other. To follow one's common sense was to refrain from affectation, or, in other words, effect a return to simple nature. Right-minded people, according to Molière, were those who waged war on affectation in the name of nature and common sense. This is embodied in Alceste when he reproaches certain epigrammatic thoughts and insipidities in Oronte's sonnet, for «ce n'est point ainsi que parle la nature» («Nature does not speak that way»). We also see it embodied in Clitandre «the honest,» so frank in his manner, so careful in passing a judgment, exposing the pedantic nonsense of a Trissotin. It is even shown in Chrysale, thick-skulled as he was, when he is made to say: «On vit de bonne soupe et non de beau langage» («One lives on good soup, not fine language»). It is brought out by the charming Henriette, that living type of the young and real Frenchwoman, formulating in three words her sound and simple ideal: «Un mari, des enfants, un ménage.» («A husband, children, and a home»). It is even better defined by Martine, a clear-sighted daughter of the people, who says in her rough language: «Qui parle tout droit comme on parle cheux nous» («Who talks quite correctly as we speak at home»). «Cheux nous» represents France as it is, the real land of the Gauls, the good old Paris of Henry IV, and the old-fashioned provinces, lacking perhaps a certain elegance but none the less replete with the good things of life. Molière is a part of «cheux nous» and therein lies his true force. Over and above everything Molière is French, his genius is the genius of France.

After Molière whom shall we name? Except Racine, with his pleasing comedy 'Plaideurs,' an imitation of 'Guêpes' by Aristophanes, dealing in a satirical manner with the procedure of law courts, we find no one. We are forced to let a generation go by before finding anyone approaching the genius of Molière, and who are eventually discovered in the persons of Regnard and Dancourt. Regnard, the next in merit to the master, was brilliant but superficial. His 'Joueur' (1696), which exposed on the stage one of the greatest evils of the period, was an amusing piece but not a comedy of life. The 'Légataire Universel' (1708) by its vivacity and burlesque situations caused uproarious laughter, but it was merely a farce reduced to verse, a comic vaudeville wherein a rascally valet, by means of a forged will, dupes an old miser to the benefit of his young nephew.

Dancourt wrote more especially plays in prose dealing with passing events. Two of them, the 'Chevalier à la Mode' (1687), and 'Les Bourgeoises de Qualité' (1700), evoke the realistic theatre by showing on the stage pleasure-seekers and parvenus.

The classical epoch is unique in history, not only for the French theatre but for modern dramatic art. With it, dramatic art reaches the same degree of perfection it attained with the Greeks. The century of Louis XIV can only be compared to the century of Pericles. Racine recalls Sophocles and surpasses Euripides. Molière is an Aristophanes, with less fanciful imagination but of deeper thought. After such masters there can only be a decline or a revolution in dramatic art.

IV. The Eighteenth Century.

In literature, as in politics, the 18th century marked a transitory era. This had its repercussion on the theatre. We find no great dramatic genius and only a few works of any originality. Classical art became distorted and we see the preparation of romantic art. We witness tragedy bordering on a state of collapse and its final demise, while comedy undergoes a profound transformation, and a new style appears — the drama.

Tragedy.— Tragedy is about to disappear and finally does disappear despite all efforts to save it. The framework is apparently retained but in reality there is nothing of that inner spirit which inspired it. It is like a body without a soul.

Crébillon was the first to endeavor to revive it. To him is attributed the expression «Corneille appropriated Earth, Racine Heaven, to me there remains Hell.» He aimed at producing an impression of terror on the audience by a succession of horrors. In 'Atrée et Thyeste' (1707), if the father does not actually eat the bodies of his children he nevertheless drinks a cup of their blood. In 'Rhadamiste et Zénobie' (1711), which was his greatest success, brutality, murder and horror succeed each other — it is nothing more nor less than bloodthirsty melodrama. In these plays, moreover, we find no attempt at character or sentimental study. It is all outward show with its incognitos, inconceivable situations and theatrical sensations. In a word, we witness all those ingenious expedients which reduce comedy to the level of vaudeville, and tragedy to melodrama.

Voltaire alone in this century understood tragedy. But even he treated it in a superficial manner. His real genius, moreover, was not in the theatre. He composed his numerous works with a facility and celerity to be deplored. His two most interesting plays were

'Zaire'. (1732) and 'Mérope' (1743). In the first we are shown an episode of the Crusades, and the love of a Christian for an infidel; in the second, and more classical piece, we learn the tragic story of a mother who, quite unknowingly, is on the point of killing her own son. But what should be particularly remarked in Voltaire's theatre (in reality rather weak), are the innovations he made. They were not always of a happy inspiration. Like Crébillon, he used and abused sensational features, especially in the matter of legitimizations. Mérope avowed her child, Zaire is acknowledged by her father thanks to «la croix de ma mère,» which we shall find taken up again in the later melodramas. The characters are not studied with sufficient care. Why? Because 'Zaire,' his masterpiece, was written in 17 days, while another of his plays, 'Olympie,' was the work of six days. According to Voltaire, it suffices to place the heroes in touching situations to be certain of exciting the emotion of the spectators.

Moreover, Voltaire sought to renovate tragedy. Timidly emulating Shakespeare, he learned enough from the latter to appreciate unity of action, but he deemed as languid «those long soliloquies» delivered by an actor semi-hidden in the side scenes. He modified the scenery, paying great attention to the setting of the stage and the accessories. He varied the choice of his subjects, borrowing from every country and every period: America, Turkey, even China ('L'Orphelin de la Chine') are represented in his works. What is more important he did not hesitate to take subjects from the history of his own country, for instance, the Crusades inspired him to write 'Zaire,' and the Hundred Years' War supplied the material for 'Adélaide du Guesclin.'

For Voltaire, the theatre became in short one vast rostrum from which he expounded his philosophical and political ideas. In 'Œdipe,' and above all in 'Mahomet,' he makes an attack on religion and fanaticism, in which connection we have his famous lines which were frantically applauded:

> " Les prêtres ne sont pas ce qu'un vain peuple pense
> Notre crédulité fait toute leur science."
> ("Priests are not what foolish people think
> Our credulity makes all their science.")

'Brutus' and 'La Mort du César' were pretexts for making an apology of civic duty and republican virtues.

After Voltaire we find no one worth mentioning except Ducis, known for his adaptations of Shakespearean dramas: 'Hamlet' (1769), 'Macbeth' (1784) and 'Othello' (1792). But there only remained a shadow of Shakespeare in these insipid and colorless adaptations, from which all the power and vitality of the original model had disappeared. They were not, properly speaking, either tragedies or dramas, which is a manifest proof that the first no longer existed and the second had not yet made its appearance.

Comedy.— Regnard and Dancourt carried over the period between the 17th to the 18th century. After them comedy was transformed and took several new styles. However, a few classical authors still remain to be mentioned, the most important of whom are Piron and Gresset. The first mentioned, a Burgundyman, a spirited writer, gave us in his 'Métromanie' (1738) a satirical portrait of the impenitent rhymster who «poursuit de ses vers les passants dans la rue» («who pursued with his verses the passers-by on the street»). He depicted, perhaps with more attraction than vigor, that harmless and ridiculous mania.

Grosset, in 'Le Méchant' (1747), treated us to a comedy of everyday life. He portrayed in forcible style that type of slanderer who injures others for the pleasure of doing so without any other profit than mere delight in causing pain. Wherever he passes he sows discontent, makes mischief between friends and separates husband and wife. It may be argued that perhaps the author lacks piquancy in this portrayal.

The two great comedy authors of the century, both innovators of totally different styles, were Marivaux and Beaumarchais. Marivaux is to comedy what Racine is to tragedy. The principal, or rather the unique, topic of his pieces is love. But it was not the passionate, vehement love culminating in suicide or crime; it was love of a delicate, refined, tender and gallant character, the sincere and profound love of the 18th century. Born in Paris in 1688, Marivaux, through his social rank and position, had access to the aristocratic salons. There he became acquainted with those exquisite, witty, cultured and sentimental women of the days of Louis XV. It was here that he met the woman of «dangerous liaisons,» for whom love was the unique preoccupation. This love the author was able to study at first hand at a period of his life when he was still unaware of his own talents although unconsciously revealing them. In 'La Surprise de l'Amour' (1722), the 'Jeu de l'Amour et du hasard' (1734) and 'Les Fausses Confidences' (1737), Marivaux showed himself to be a promising painter of true love. All his heroines might repeat with Silvia: «Ah! je vois clair dans mon cœur» («My heart sees clearly!»).

Beaumarchais presented a singular contrast to Marivaux. Like him he was a Parisian, but a Parisian of the people, of an intriguing and unscrupulous nature. He became mixed up in numerous court intrigues and was associated with many financial enterprises of a more or less shady character. He lived during those stirring times of riotous living which preceded the Revolution. As a matter of fact, his masterpiece, 'Le Mariage de Figaro' (1784) was produced on the eve of the Revolution of '89. Beaumarchais created in Figaro a never-to-be-forgotten type, which, moreover, is no other than his own portrait. The character was first seen in the 'Barbier de Séville' (1775), the amusing and eternal story of the old guardian duped by his young and pretty ward who elopes under his very nose. Figaro, who naturally is the very soul of the piece, is a study of Molière's valet on a bolder scale; the Mascarille or Scapin, not content with merely serving his master but having personal ambitions and seeking his own fortune. Shrewd, venturesome and enterprising he knew how to get on in the world. Figaro becomes quite an important person. He is the type of plebeian, disappointed and despised, but tenacious and with an ardent desire to enjoy to the full the pleasures of life which up to the present have been meted out to him in such meagre quantities. We have a picture of him in 'Le Mariage' when he faces his lord and master, Count Almaviva, who wishes to steal his wife from him. Well he knows how to handle the situation, how to reply! how to proceed! Figaro is the type of individual we shall see in the revolutions of 1789, 1830, 1848 and 1870, overthrowing the old despotic régimes and installing republics. Meanwhile, he is not afraid to speak a few home truths to the nobility: «Parce que vous êtes un grand seigneur, vous vous croyez un grand génie; vous vous êtes donné la peine de naître, rein de plus, tandis que moi, morbleu!» («You think yourself a great genius because you are a grand lord, but you had to go through the pain of being born as well as I»).

In short, Figaro is Beaumarchais. The author is incarnated in his work, in which we have a foretaste of romanticism. His ideas, theories and expressions of hatred were applauded. His sympathies and feelings are ours. It should be added that the piece is admirably arranged and written in an acerb and sarcastic strain in which every word tells. It shows a thorough understanding of dramatic art. Beaumarchais, at any rate in his best plays, displayed a master hand in comedy, and ranks without question next only to Molière.

Finally, 'Le Turcaret' by Le Sage, should be cited. This piece was produced at the beginning of the century, in 1709, to be precise, and was remarkable for its attack on financiers, those jobbers and unscrupulous bankers who speculated on the credulity of the public and shamelessly ruined the simple but honest folk who had confided in them. It was the first play of this nature to be put on the stage, and it is the first example we have of realistic art in the French theatre.

Drama.— The great novelty of the 18th century from a dramatic art point of view was the appearance of a new style, the drama, or in other words, the fusion of tragedy and comedy, so severely discountenanced by the classical writers. The first effort was made by Destouches, whose idea was to compose a comedy-character piece, in serious strain, and from which laughter was to be banned. All he succeeded in achieving, however, was a play in bad taste, consisting really of a series of laical sermons intended for general edification. Only one of his plays, 'Le Glorieux' (1732), is at all worthy of remark, and that because the author cleverly instilled into it a large measure of pathos and sentimentality.

La Chaussée had a tendency to exaggerate this innovation. He created pathetic comedy which merely consisted in a rough and ready handling of commonplace situations, thereby appealing to the spectators' sentiments. The new element he introduced was that, instead of interesting the public in the misfortunes of royalty and aristocracy, he chose his characters from amongst the people themselves and depicted domestic misfortunes of private families. In his piece 'Mélanide' he succeeded so well that he moved all the weaker sex to tears, and showed himself to be the direct predecessor of Emile Augier and the younger Dumas. The play had a phenomenal success.

Finally Diderot, in 'Le Fils naturel' (1757), and 'Le Père prodigue,' created the popular drama, which was, however, neither more nor less than pathetic comedy written in prose. Beaumarchais imitated it in his 'Mère Coupable' (1792). These works, however, of a tamtam and empty style, merely interest us as an indication of the new era then imminent. Sedaine alone treated this style with any degree of ability in his 'Philosophe sans le savoir' (1765), wherein is a life-like portrayal of the great merchants of the 18th century, and also a charming and touching love episode of two young people.

Apart from the works themselves, which are poor, the theory of the popular drama should be examined. It was formulated by Diderot who sought to infuse between too conventional tragedy and comedy bordering largely on caricature a really genuine style which would represent a new ideal of humanity in the different spheres of life, for example: a father, a judge, a merchant. It was an interesting idea and one capable of considerable development but unfortunately it was incomplete. Of what good is a state of existence without character? It is an abstract idea without life, a symbol without reality. A father, in his capacity as such, a judge, in his capacity as such, as a mere state of being, do not exist. Who, therefore, can be expected to take an interest in them? We must unite the two conceptions, show character exerting its influence on a state of existence, or modified by it. In this manner alone shall we have the complete human being. Balzac's romance, 'La Comédie humaine,' shows us such a state. These endeavors to transform drama were likewise premature. They were unsuccessful, and toward the end of the century comedy was revived which was traditional, unpretentious but mirthful. Voltaire distinguished himself by a few light works such as 'L'Enfant prodigue' (1736) and 'Nanine' (1749).

The period can be summed up as follows: failure of tragedy, great modification in comedy, a tendency of the two styles to fuse and reunite into drama. It marks the end of one epoch and predicts the dawn of another.

V. The Romantic Period.

The 19th century, following on the political revolution, was also to be marked by a revolution in French literary art. Romanticism was especially in open revolt against classicism. It clamored for liberty in art, rebelling against those rules to which it was bound by classicism and which did not give free scope for its genius. In future, the poet would compose his works without being impeded by hard and fast rules. The principal lines this new art would follow would be: free scope in imagination, sensibility provoked to its highest pitch and hypertrophy of personality. It would be lyrical rather than dramatical.

We accordingly find ourselves in the presence of an original conception which has no precedent in the past literature of France. It has produced masterpieces of incomparable vigor and brilliancy. But this victory of sentiment over reason, of liberty over control, had certain dangers and weaknesses which are felt in the theatre even more than elsewhere.

The Theory.— In order to understand the dramatic art of the epoch it is necessary to examine the theory under which it was inspired. In this way it is possible to make a comparison between what it was desired to do and what has been accomplished. A brilliant example of the conception of romantic drama will be found in Victor Hugo's 'Préface de Cromwell,' and a more simple, if perhaps more forcible, one in Vigny's 'Letters.' 'La Préface de Cromwell' was one of the earliest works of Victor Hugo, who in 1827 was only 25, which accounts for the boldness of his conceptons. According to his theory drama should aim at the truth, the whole truth and nothing but the truth. On this basis it must consequently include everything: comedy, tragedy, the grotesque and the sublime. This was, moreover, Shakespeare's dictum: “Shakespeare, c'est le drame, le drame qui fond sous un même souffle . . . le terrible et le bouffon, la tragédie et la comédie. La poésie complèt est dans l'harmonie des deux contraires” (“Shakespeare is the drama, the drama that sinks even below a whisper . . . the terrible and the clown, tragedy and comedy. Perfect poetry lies in the harmony of the two contrarieties”).

Therefore, according to this formula drama comprises everything. It does not choose. Selection was the greatest mistake made by the classical authors; to choose is to mutilate a reality which is whole and indivisible. In Victor Hugo's works, Hernani, the vagabond, rubs shoulders with Charles Quint the Emperor; Didier, the foundling, jostles King Louis XIII.

Drama is spread over time and place. Unity of place disappears — from the Louvre of François Premier we are transported to a prostitute's den, from Valladolid in Spain to Aix-la-Chapelle in Germany. Unity of time likewise disappears — days, months, sometimes years, elapse between the opening scenes of the piece and its dénouement. The action is no longer confined to the four walls of a room and the 24 hours of a day.

Unity of action, however, is respected, to which is added unity of impression. Interest must be sustained and the play proceed along its appointed lines. Terror and pity must be kept up to the end, and we no longer have, as in the fifth act of melodrama, a happy ending belying at the last minute the normal and tragic action of the piece. Romantic drama must wind up in misfortune and therefore be true to life.

When compared with melodrama it presents still another essential difference: the style is maintained and verse is employed in preference to prose. These verses contain the classical 12 syllables of Alexandrin, but they tend to improve in versatility and color. Lines are cut up to suit a new cadence of verses, the pause displaced and encroachments on the next verse to complete the phrase are risked. We all remember the great outcry which saluted the first verse of 'Hernani' — a daring innovation of the poet:

" . . . On vient par l'escalier dérobé."

(" . . . Coming along the stairs—undressed.")

Finally, no hesitation is made in using the right word, the familiar or trivial one if necessary. Instead of the noble style we have:

"Un vers libre, franc, loyal, osant tout dire sans puderie, tout exposer sans recherche."

("A free verse, frank and loyal, daring to tell everything, without prudery, expose everything without inquiry").

Vigny resumes in a still clearer manner the conditions of this new style. According to him drama is modern tragedy. Consequently: (1) In its conception we must take a broad outlook on life and not the narrow-minded one resulting from common intrigue. We must not be satisfied with a hastily worked up crisis, but show a study of life extending over long periods and experience. He prefers Shakespeare's style to Racine's.

(2) In its composition we should draw characters, not rôles; we would represent peaceful scenes, without drama, in which would be sprinkled an element of tragedy and comedy. No longer would we have a Rodrigue or a Phèdre acting a scene in a person's life of ephemeral duration, but a Hamlet or a Lady Macbeth who maintain their character throughout their whole existence. Assuredly the dramatic and artificial tone would be lacking but in its place we should have, as in actual life, our calm, happy or our sad moments.

(3) In its execution it would have a free and easy style — comic, tragic, sometimes even epic. The characters would not all speak the same pretentious language. The grandiloquence of kings and the passionate words of great heroes would be mingled with the simple sayings of the people and the merry quips of jesters. It is, in short, altogether the reverse of classical literature; real life replaces convention. It is a very large and revolutionary program. An examination of the works will enable us to see whether it has been carried out, or whether it is even possible of execution.

The Works.— Romanticism made its appearance on the stage in 1829 with 'Henri III et sa cour' by Alexandre Dumas, and 'Othello' by Vigny, and in 1830 with 'Hernani' by Victor Hugo. The struggle was keen between the old and the new schools. It resulted, however, in the defeat of the old school and the triumph of the new.

We are indebted to Alexandre Dumas père for the historic dramas 'Henri III,' 'Christine' (1830) and 'Charles VIII et ses vassaux' (1831). His psychology was rough and ready and his characters were rather in the nature of puppets. But he was undoubtedly imbued with dramatic instincts and understood the importance of action in a play. There was life in his pieces and he knew how to maintain interest and keep the audience in hand right up to the dénouement. But he was too apt to rely on easy sensational features and very quickly drifted into pure melodrama. His 'Tour de Nesle' (1832) is an example of this.

The art of Alfred de Vigny, a great poet and thinker, was of a more sober order, but in temperament he was a poor dramatist. His adaptations of Shakespeare, 'Othello' and 'Shylock,' and his historical drama 'La Maréchale d'Ancre,' were unemotional, not particularly scenical and indifferently composed. His 'Chatterton' (1835), however, was of a much higher order and is the masterpiece of the Romantic theatre. Here we have quite an intimate drama, the action not extending beyond a few hours. It is the story of a man who has written a letter in the morning and who waits for the reply until evening; when it at last arrives it kills him. In 'Chatterton' we have drama of a philosophical and idyllic order. The former, and most pretentious, leaves us cold. Vigny proclaimed the rights of the poet which society had treated with contempt and condemned to suicide. This was the inert part of the work. But the chaste love, which never dares to declare itself, of Kitty Bell and Chatterton, that exquisite tenderness of two frail, pure beings, victims of the conditions of life, and which is only revealed in death, is a penetrating and poignant piece of drama which makes this work incomparable. No work, not even the masterpieces of Victor Hugo, attain such a degree of sincerity and perfection.

It should be noted that, by a strange coincidence, this unique work is classical in many respects: unity of place, unity of time and a crisis which is passionate, violent and short. But it remains romantic in one point: Chatterton is not an individual but a symbol, merely a name. His soul is the soul of the poet.

Victor Hugo is the master of Romantic drama. He began his career with 'Cromwell' (1827), a piece unsuitable for theatrical representation, and which, like his 'Préface,' is more valuable from the point of view of a public declaration. These were followed by several other works, most of them in verse but some (the poorest ones) in prose. The most important were 'Hernani' (1830), 'Ruy Blas' (1838) and 'Les Burgraves' (1843). Later on, the author published two pieces but did not have them staged: the 'Théâtre en Liberté' (1866) and a mystical, gloomy drama, 'Torquemada' (1882). Hugo's style is odd and disconcerting. He was essentially a poet and not a dramatist, and to this must be attributed his brilliancy and also his shortcomings. He was above all lyrical, attaining even the sublime. Some passages from 'Hernani' and 'Ruy Blas,' of incomparable harmony, are an enchantment to the ear. Witness his duo between Hernani and Dona Sol, between Ruy Blas and the Queen, between Marion Delorme and Didier, or let us say between the Lover and the Beloved, the eternal lovers of romance with their melting and voluptuous language, whose words sink into the soul and transport us into a realm of dreams. Sometimes he uses the lash of satire, manipulated by the inflamed accents of Ruy Blas to stigmatize extortioners, those priests and courtiers of Spain; or the epical language of a Ruy Gomez de Silva in the portrait scene ('Hernani'), or even the truculent and superb comedy of Don César, that tatterdemalion so proudly arrayed in his ragged raiment. Hugo, the wonderful virtuoso, touches every string of the lyre with a master hand. But his characters have no living counterpart, they do not belong to this world. They speak at great length and magnificently, but emptily. They speak for their own satisfaction and not for others, not merely to make themselves heard but to portray their own character. And what definition they make! Eloquent, but how puerile! Hernani is:

> ". . . Une force qui va
> Une âme de malheur faite avec des ténèbres!"
> (". . . A force that goes
> An unfortunate soul made with errors!")

Ruy Blas, the lackey enamored of a Queen:

> "Un ver de terre amoureux d'une étoile,"
> ("An earthworm enamored of a star"),

and Don César, the great Seigneur, who, ruined, associates with the ruffians of Madrid:

> "Un pauvre grelot vide où manque ce qui sonne."
> ("A poor, empty rattle, lacking that which sounds").

In reality they are not individuals but mere symbols. Ruy Blas represents the People; the Queen, the eternal Woman. In 'Angelo,' Catherina is the woman of society and Tisbe is the woman whom society scorns, but both are types of the weaker sex, both stand for Womanhood.

In these large generalizations and empty syntheses reality is motionless and senseless. There are no really life-like characters, only puppets, magnificently presented it is true, but without a trace of psychology or the least sign of individual life.

What matter! Strictly speaking it is not real dramatic art but it is undoubtedly a dazzling stage picture. We are irresistibly carried away by the effusion and spirit of the poet. Of drama in the real meaning of the word we find practically nothing. The plots are childish and the situations often descend to the level of common vaudeville; for instance, we have a king hiding in a cupboard, an emperor disguised as a beggar, a cabinet minister answering the door or performing other menial offices like any properly trained domestic servant. If we stopped to think we could not refrain from smiling, but we are not given time for reflection, overwhelmed as we are by Victor Hugo's hardy conceptions, brilliant metaphors and striking contrasts. The poet makes up in richness of language for the poor dramatic quality of his works with their weak psychology and elementary scenic effects.

Alfred de Musset did not write with a view to his works being staged, the result being that dramatic art was enriched to a greater degree than might otherwise have been the case. Being absolutely free from theatrical considerations, his imagination took wings and gently flying from flower to flower, so to speak, he composed rare and beautiful bouquets. In his 'Comédies et Proverbes' we see Musset at all stages and conditions of his life. We see his personality in Fortunio, that Chérubin of Beaumarchais' creation, but more poetical, sacrificing his life for a smile from his adored one; and we meet him again in Uncle Van Buck, whom 50 years of life has rendered wise and only gently chiding. But we find a more lifelike portrait of Musset in Perdican or Octave, Valentin or Fantasio, the gentle hero, voluptuous yet sensitive, jesting yet sincere, sceptical yet passionate. He frolicked with love, laughed and mocked at love, but he was in turn tricked and fooled by love. He sought to trifle too much with love but "on ne badine pas avec l'amour."

In this we have an explanation of his works, which, while light, were at the same time profound, those "marivaudages" (works of a highly affected style) but infinitely more sad and more dramatic, nearly always ending in melancholy and suffering, sometimes even in death. He roamed in a world of dreams, in almost unreal surroundings, calling to mind the fairy scenes of Shakespeare. His imagination, left to itself, wandered at random. It was pure lyricism without the slightest philosophical or other pretension. These proses of Musset have furnished the French theatre with its purest poetical productions.

Classical Reaction.— The Romantic theatre was doomed to disappear. Its success had been brilliant but ephemeral. It should not be forgotten that dramatic art lives essentially on action, and romanticism which is the expression of mind in its most personal conception does not respond to this fundamental condition. The reaction was not long in taking place. ‘Louis XI’ (1832), and ‘Les Enfants d'Edouard’ (1833), the pseudo-classical works of Casimir Delavigne, were frantically applauded, less for their intrinsic worth, which was poor, than because they were against Victor Hugo's style. Ponsard, the author of ‘Lucrèce’ (1843), and ‘Charlotte Corday’ (1850), was more eloquent, if not more dramatic, and his prosaicism was not quite so flat.

Toward the end of the 19th century, Henri de Bornier wrote, just after the war of 1870, ‘La Fille de Roland’ (1875), the plot of which was fairly well arranged, evoking the national glory of France, and obtaining an immense success. François Coppée, with ‘Severo Torelli’ and ‘Pour la Couronne,’ and Jean Richepin with ‘Nana Sahib’ and ‘Par le Glaive’ revived the popular taste for drama in verse. Still more recently, Rostand with ‘Cyrano de Bergerac,’ ‘L'Aiglon’ and ‘Chantecler’ made an effort to renovate the style of romanticism. We all know the success he obtained with these pieces, especially the first which was applauded to the skies.

But public taste soon tired of this brilliant but rather artificial art. It calls for truth and reality which is found lacking in the extravagances of romantic drama. This feeling brought comedy once more into favor, which hereafter was destined to become more and more realistic and contemporary. We were to descend, so to say, from the clouds to mother earth and substitute actualities for the historical past.

VI. The Realistic Period.

Classical Comedy and Vaudeville.— The years which followed on the great development of Romantic drama were a period of relief. A movement of reaction toward Naturalism began to make itself felt and more simple forms of art came into favor again. Comedy relegated drama to a secondary place. As a matter of fact comedy had never completely lost its hold on the public, but during the first half of the 19th century its more sordid side only appealed to spectators. We witnessed the triumph of vaudeville with Picard and especially Scribe. This latter name is an incarnation of the epoch and at the same time forms a judgment thereof. Scribe was the exact antithesis of an artist. In his works no trace is found of poetry or style. He was, however, an adept in stagecraft, excelled in the construction of a plot and a pastmaster in the preparation of theatrical situations. His characters had to be manipulated like puppets, which in fact they really were; they appeared, disappeared, met unexpectedly, lost one another only to meet again at the opportune moment. In his best pieces, i.e., those most cleverly arranged, ‘Bertrand et Raton,’ ‘La Camaraderie’ and ‘Bataille des Dames,’ he handled complicated situations with a master hand.

Victorien Sardou followed in his footsteps. He, also, replaced art by artificiality and grasped in a remarkable manner all the tricks of the trade. He was able to machinate admirably an intrigue whether in the nature of vaudeville like ‘Pattes de Mouche’ or when dealing with a historical question as in ‘Patrie’ or ‘Theodora.’

There was more sincerity and realism in the astonishing vaudevilles of Labiche. A grain of common sense always sobered his coarsest farces. ‘Monsieur Perrichon’ was as unemotional toward him who helped him as he was ardent in befriending others. His remark «Vous me devez tout . . . je ne l'oublierai jamais» («You owe me everything . . . I shall never forget it») is typical of the man. He was, moreover, capable of better work than that displayed in ‘Le Chapeau de Paille d'Italie’ with its *quid pro quo's* and cock and bull situations.

The operettas of Offenbach, written with the collaboration of Meilhac and Halévy, were masterpieces of satire concealed beneath a considerable amount of buffoonery, particularly ‘Orphée aux Enfers’ and ‘La Belle Hélène.’

Popular Comedy.— Real comedy, i.e., comedy of life and comedy of character, was represented by these two authors, Emile Augier and Alexandre Dumas fils, with a disposition for the pathetic comedy of La Chaussée and the popular drama of Diderot. Augier was that type of the middle-class man, having all his sterling qualities but also his narrow-minded ideas. His ideal was sound but prejudiced. He desired more than anything else to maintain and fortify home life. He waged war to the knife on everything pertaining to the romantic. His fantastic ideas concerning romanticism disturbed the most respectable women: in ‘Gabrielle’ we see a woman about to desert her husband and child because she is mentally upset and thinks she has poetical aspirations. In the ‘Mariage d'Olympe,’ Augier attacked the artificial sentimentality of those who considered the rehabilitation of fallen woman as possible and desirable; in ‘Les Lionnes pauvres’ and ‘Les Fourchambault’ he depicted the havoc wrought by a life of luxury and pleasure, and in ‘Ceinture dorée’ he made a violent attack against the custom of giving dowries and financially arranged marriages in general. His loyal, upright mind and aversion for innovation made him the champion of the traditions and the morals of the people.

Himself a commoner in the true meaning of the word, he created certain types of the middle class which will ever survive: Monsieur Poirier, the counterpart of the Monsieur Jourdain of Louis Philippe's reign, the parvenu with his mania for greatness sacrificing his daughter to his ambition by marrying her to a ruined nobleman who in addition to deceiving her despises his father-in-law; or Maître Guérin, the unscrupulous notary, with his dishonest associates, whose whole character is summed up in his sublime but wily expression: «Je tourne la loi, donc je la respecte.» («I twist the law, yet I respect it»).

Moreover Augier thoroughly understood the intricacies of the theatre. His pieces were admirably planned, and he had the gift of being able to develop a character in all dramatic situations. Dumas fils exercised his talent on a higher plane and followed a more generous ideal. He wrote pieces embodying arguments, carefully arranged, but the principal object of which was to moralize.

His ideas were certainly bold for the period in which he lived. He advocated the rights of illegitimate children, and in ‘Denise,’ those of the unwedded mother. He even made himself the champion for the woman who has erred, and in ‘La Dame aux camélias’ and ‘Les Idées de Madame Aubray’ proposed to rehabilitate her. In ‘Francillon’ he proclaimed that adultery is just as criminal on the husband's part as the wife's and even went so far as to recognize the right of the latter to take revenge. These pieces which might possibly be deemed frigid escape this judgment on account of the skill and wit with which they are treated. Dumas inherited from his father the spirit of the theatre and he wrote in a vigorous style, often brilliant and sometimes eloquent.

Among the less known authors of the end of the 19th century, we must not overlook Pailleron. His ‘Monde où l'on s'ennuie’ was a witty, if somewhat puerile, criticism of the literary salons. Henri Becque, talented in a bitter and harsh style, should also be mentioned. His realism is of a pessimistic nature. In his piece ‘Les Corbeaux’ we are shown a pack of avaricious and unscrupulous creditors eager for their booty, reducing a family to misery after the death of the father. His ‘Parisienne’ was an exhaustive but unjust study of the society woman fluttering between her husband and her lover, or lovers. Finally, ‘L'Amoureuse’ by Monsieur de Porto-Riche, presented us with a curious and bewildering psychological document on the mentality of the eternal female.

The Free Theatre.— Toward the end of the century, an interesting experiment was made by Monsieur Antoine. Under the influence of naturalism inspired by Zola and the Goncourts, he founded the free theatre. He sought to protest against the artificial character of contemporary dramatic art, and depict on the stage an exact picture of actual life. At first he employed his energies in criticising to excess passing events and personalities in a spiteful but witty manner, and, under the cloak of realism, he took pleasure in describing, with exaggeration, the defects and turpitudes of humanity. But it must not be forgotten that he kept “open house” for new authors, and we are indebted to him for some pieces by Jean Jullien, Georges Ancey, etc., whose names might never have been brought to the notice of the public if he had not accepted their plays. He also staged foreign masterpieces, particularly those of Ibsen, ‘Les Revenants’ and ‘Le Canard Sauvage.’ Finally, he paid great attention to the scenery, to which he gave a more real appearance, and introduced more simplicity in the play of the actors.

Present Tendencies.— This evolution of realism in the theatre is not yet completed. Possibly it is counteracted by other tendencies more or less undefined. The dramatic production in France is more abundant than ever but it would seem that it is still feeling its way. Spontaneous comedy, pure and simple, is a thing of the past. We have above all pieces of an ill-defined and composite style embodying both comedy of every-day life, character-comedy and drama. Many eminent authors such as Capus, Donnay, Lavedan, Romain Coolus, Bataille, Bernstein, know how to combine wit with emotion. On the other hand a higher ideal is sought and social problems are discussed on the stage. Monsieur Brieux attacks our whole legal system in ‘La Robe Rouge,’ and poses difficult questions concerning sexual morality in ‘Les Avariés’ and ‘Avortement’; Monsieur Hervieu in ‘Les Tenailles’ and ‘La Loi de l'homme’ espouses the cause of feminism; Monsieur Emile Fabre evokes and condemns in ‘Les Ventres dorés’ the big financial scandals which have recently been the subject of a large press campaign. Monsieur de Curel, one of the most talented dramatic authors of our day, deals with touching and difficult cases of conscience in ‘La Nouvelle Idole.’ Has a famous physician the right to sacrifice the life of a patient in the interests of science, or jeopardize an existence to save thousands of other human beings? In the ‘Répas du Lion’ we are asked to solve the problem of whether great intelligence and highly refined ideals should concentrate themselves to the welfare of the ignorant masses who would destroy them.

Thus we find many talented and promising writers but no particular name which stands in relief and no style clearly dominating another. Such is the present state of dramatic art in France, and as such it holds its own throughout the world, giving stimulus to other peoples. As far as it can be permitted to prophesy in such matters, it would seem likely that the theatre of the future would have a tendency to take up political and social questions. But what has the future in store for us? Who knows if as the outcome of the Great War which is scourging Europe a new world will not be born which will create a formula of art as yet unknown? In any case, France, which up to now has been the special cradle of dramatic art, will certainly not be the last to discover its proper trend and perhaps indicate it to others.

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II. SPECIAL: (*a*) *The Middle Age.*— Petit de Julleville, ‘Les mystères — la Comédie et les moeurs en France au moyen-age’; Ed. Fournier, ‘Le Théâtre français avant la Renaissance.’ (*b*) *The Renaissance.*— Ed. Fournier, ‘Théâtre français au XVIème siècle’; Em. Faguet, ‘La tragédie française au XVIème siècle.’ (*c*) *The Classical Era.*— G. Lanson, ‘Corneille’; Sainte-Beuve, ‘Port-Royal’ (liv. VI); J. Lemaître, ‘Racine’; G. Larroumet, ‘Molière, l'homme et le comédian’; E. Rigal, ‘Molière.’ (*d*) *The Eighteenth Century.*— H. Lion, ‘Les tragédies de Voltaire’; Lintilhac, ‘La comédie au XVIème siècle — Beaumarchais et ses œuvres’; Larroumet, ‘Marivaux.’ (*e*) *The Romantic Period.*— P. et V. Glachant, ‘Essai critique sur le théâtre de Victor Hugo’; Lafoscade, ‘Le théâtre d'Alfred de Musset’; Ern. Dupuy, ‘Alfred de Vigny.’ (*f*) *The Realistic Period.*— Em. Faguet, ‘Notes sur le théâtre’; J. Lemaître, ‘Impressions de théâtre’; R. Doumic, ‘Essais sur le théâtre contemporain.’

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16. FRENCH MUSIC. Animated by an intense new life, the French School among all schools of music stands out rich and flourishing. Retaining all that is best in the past, it looks fearlessly toward the future, and represents a harmonious classical epoch.

French music displays with profound truthfulness the countless national sensations of the present day. With some composers it expresses a religious sentiment, with others it has become pagan, a noble and sound paganism which surrenders itself wholly to the beauty of its surroundings, in hymns of pantheism, in which all the voices of the universe and of mankind are blended. The history of music since the «déchant» of the Middle Ages, from the first «septièmes non préparés» of Monteverde is a continuation of harmonic discoveries. Moreover, as occasion offers, our art of to-day remains rhythmic, distinct and vigorous. Its vigor is quite classical, made to balance between sentiment and reason.

Of primitive Gallic music we are able to recognize traces in the old songs of Brittany. For Brittany is faithfully traditional as much by her relative remoteness as by the well-known stubbornness of her people. Barzas-Breis, H. de la Villemarque and the collection of popular melodies copied by Bourgault-Ducoudray contain admirable examples. As in some Scottish or Welsh airs, the Celtic soul lives again. The reverie, face to face with wide horizons, serene and tender piety, sometimes even a real gladness, are blended in those accents, the character of which, well defined, remains as striking as in former times. One hears in them those antique modes which were equally those of the earlier Greeks. The Dorian, whose virile energy and nobly harmonious gravity belonged also to that of the Doric order; the Phrygian, wholly in contemplative ecstacy before the divine scenes of nature; the Lydian, descended from Asia Minor, brilliant with light and of a singular charm. It is probable that these modes were discovered by the people of Brittany, entirely on their part, without having been derived from the Greeks by the intermediary of the Gallo-Roman conquest. Modern composers, grouped under the name of «Celtic School,» consider that Brittany owes nothing to the Latin genius. Their influence on our music is undeniable and fruitful.

The Middle Ages saw an extremely appreciated art. Our Merovingian kings loved music; later, in their heroic poems, the *trouvères,* the troubadours (as formerly the aged Homer) related the glory of the heroes. More profane, some popular refrains translate wonderfully the ironical gaiety of a people who, according to all appearance, were sensitive to the beauty of sound. Let us call to mind the amusing 'Prose of the Ass,' wittily taken up by G. Pierné in his «Scherzo» of the 'Year one thousand.'

It belongs to comic art, so distinctive in its style, of which certain sculpture in cathedrals has left us grotesque proofs. On the other hand, sacred music reaches to serene heights of collective expression in the Gregorian chants. It has sometimes been thought that these melodies are none other than the themes of ancient Greece, baptized as Christians for the occasion, as the churches of Rome made use of columns from heathen temples. Thus, legend attributes the *Te Deum* to the inspiration of Sophocles. This hypothesis would not appear to be absurd. The oldest of the Gregorian chants are very simple, syllabic, e.g., the *Dies Iræ.* In the course of time, a freer melody soars higher toward the skies, similar to the expansion of the Gothic cathedrals with their «flamboyant» ogives. Plain chant, the expression of which has no individuality, might seem at first cold, but its pure meditative line, joyful even in the *Sanctus* and the *Alleluia* is full of stirring sentiment. To the Gregorian chant, the art of the contrapuntists of the Renaissance owes its birth. It acquired a sure style and masterly skill with the musicians of the 16th century; their vocal counterpoint was an accomplished science. The descriptive tendency to which our artists often ceded in the course of time asserted itself in the 'Battle of Marignan' and the 'Awakening of the birds,' by Ch. Jannekin. This name, like those of Claude le Jeune, Guill. de Costeley, Cl. de Scrimzy, are familiar with us to-day.[*] As to the sacred art of this period, its beauties were brought to light by the chanters of Saint Gervais. In every respect it harmonizes with the architecture and to the proper atmosphere of the cathedrals. The reign of Louis XIV saw the ancient gamut gradually abandoned, retaining only the ordinary major and minor. On the other hand, whilst the 16th century reserved, in general, the same importance in all its parts, the melody of the 17th asserted itself, isolated and preponderant in juxtaposition to the accompaniment. But it did not burst forth with the boldness or the fulness that it has attained since in modern music. In spite of the excellent writing of our authors, the vocal line retains a sort of timidity in the expression. The art of sound is the slave of the public. It aims to please, to amuse. The language of the personal sentiments of the musician and especially his complainings would scarcely be allowed. Instrumental works and pieces for the organ are concise but charming, sober, full of good humor and of a real nobility of thought. At the opera, poetry is the great ruler and the composer dares not yet *translate into music* the sentiments which it describes. Tulli, the most illustrious, although Italian by birth, submitted entirely to this æsthetic style. In spite of the restrictions which resulted from it, our school was very flourishing; there were organists, harpsichord-players of infinite talent, such as L. Marchand, W. de Grigny, Clerambault, Cai, d'Herlevoix, Couperin and especially J. P. L. Rameau. This great master to whom we owe so many delightful, even really vigorous works, receives to-day the just homage of the Debussy, Dukas, Ravel. Our modern artists have recognized the link with the past. Moreover, without imitating it, or losing any new acquisitions, many are happily inspired by ancient music: its measure, its purity of style, its lucid discernment. Yet, in spite of a real independence, and however thoroughly a musician Rameau may be, one cannot say that either the qualities or the national soul are to be found entirely in him. Modern music by its expansiveness and its discoveries has turned to the light, the face of that soul, left in the shade by the masters of former times. The latter, polished, worldly, traditional, do not reveal the highly exalted and lofty imagination of France. Our professors of rhetoric often insist on the order that characterizes the art of our country; and it is quite true, but it is not everything.

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[*] Thanks to the preformance of the Society of the Conservatoire, the Society Guillot de Sainbris, with J. Griset, of the Schola Cantorum with Ch. Bordes and d'Indy as well as several excellent vocal quartets.

[†] The most celebrated of these composers are R. de Lassus, Josquin des Prés, and Goudimel.

It was romanticism which at first appeared to widen our horizon. It commenced with the encyclopedists and J. J. Rousseau. These philosophers foresaw how our art would become greater one day, by the action of a free voice and a spirit entirely human. It was that period, forerunner of the Revolution of 1789, in which the ideal of those thinkers, charmed with solidity, gave, at last, to the cry of mankind, the right to live. And that cry, with on the other hand the energy of a resumption of hope, leading to hymns of serene and enthusiastic joy, is almost the whole of our music of the present day.

After the celebrated ‘Quarrel of the Buffons’ in which the Italians triumphed, the works of Gluck, in harmony with the principles of the encyclopedists, had a considerable influence. But our musicians did not grasp the true lesson. These works seem to have made them forget those of Rameau. It was not a question for them to curtail their accompaniments. Indeed Rousseau wronglv judged that a more expressive art demanded a simplification of accords and counterpoint; but modern music and already that of J. S. Bach proves that this is absurd. A noble harmony more often only accentuates the beauty of the melody. It ought to have been understood that the admirable technic of Rameau was necessary to our school and further that, that kind of wider expansion in singing sufficed, coming as it were, to animate a dense and rich material. Unfortunately, it is easier to impoverish an art, and the principles of Rousseau, followed too strictly to the letter, had that effect. Then, doubtless, there was a desire to render music popular. It was not wanting in interest, however, in the revolutionary epoch, especially with the famous ‘Song of the Departure,’ also in the ‘Song of the 25th Messidor,’ triple choruses by Méhul, and above all with the matchless ‘Marseillaise’ of Rouget de l'Isle a unique work, born of exceptional circumstances. It has never been reproduced; besides nothing is more rare than a noble heroic song. Finally, let us call to mind the charm and intelligence of Grétry, the real beauty of Joseph de Méhul, the works of Lesueur, full of noble and excellent intentions. But a solid musical structure, vivified with songs of particular harmony and rhythm, new and audacious — such was the appanagé of Berlioz. An extraordinary phenomenon, this really genial musician had been obliged to invent nearly all his resources (when still at the Conservatoire, he wrote the ‘Overture to the Free Judges,’ he ignored the German masters with the exception of a few of Gluck's works). Let us remark that Hector Berlioz is essentially French. It was not under the German influence that he wrote works of such ample dimensions and vigorous sonorousness, (he, however, none the less appreciated the subtle delicacy of the orchestra). It was a natural taste. That taste for the grand (and not the colossal in the wrong sense of the word, for with Berlioz there is neither bombast nor tediousness), is necessary to his romantic enthusiasm, as otherwise is to Rabelais, a close, serried style with copious ‘Litanies.’ Moreover, if romanticism were entirely in the right in not disowning the art of foreigners, neither that of our Gothic past (so distinctly our own), this movement of free, even revolutionary sensibility, was national — caused by the same state of the mind. One should also notice that Berlioz possessed that very French sense of measure (and measure may be kept in great works for it concerns only harmonious proportions); lastly his romanticism was balanced by his classical tendencies, his Virgilian education (the traces of which is revealed in the ‘Trojans’ and in the pure ‘Childhood of Christ’). His power is never embarrassed by a dull heaviness, his development is, at once, wide and concise; his idea, neither diffuse nor diluted, remains clear and striking. Berlioz is our near ancestor, because without him the modern world is already established. The ‘Invocation to Nature,’ ‘The Fisher's Lament,’ some pages of ‘Romeo and Juliet,’ the ‘Septuor of the Trojans’ reveal the emotion displayed before the mystery of things that the 19th century taught us to love: the sea, the mountains, the night, the breeze in the offing, the distant voyages. And he is the creator of the symphonic poem and his orchestra has remained young. The technic of his art is almost ours too: liberty of harmony, rhythm and development.

Very distinct from Berlioz, often wrongly understood in his simplicity and still also our ancestor was Charles Gounod, the exquisite and grand musician who immortalized the act of the “Garden Scene” in ‘Faust.’ This act was disdained by the critics, “There is nothing in it.” Accustomed to the violent and superficial operas of Meyerbeer, *all inner action* could not exist for them. Now, this inner action so conformable with the idea even of Monteverdi, Gluck, Wagner, and all of those who have made the “theatre of the soul” of profound sentiment (to begin with Æschylus in ‘Prometheus’), that is decidedly the ideal aim of French lyrical drama. That in consequence of the Wagnerian allurements Gounod might have seemed antiquated to certain ears it matters little. In general, our best musicians have never ceased to appreciate him, from Fauré to Ravel. And we know what our modern school owes to him. Indeed, like Mozart, like Fauré and like Debussy, Gounod was *music itself*. If there are some irregularities in his work (for he does not free himself entirely from the tedious musical æstheticism of his epoch), they will not prevent us from loving that which has been preserved from the ravages of time; particularly that extreme charm of which the strong and beneficent perfume has not evaporated.* With Gounod there is something of the pagan in the ingenuity with which he surrenders himself, an instinctive and luminous ease, the softness of the phrase and of the harmony.

The 16th century saw, with the classical spirit of the Greeks and Latins, the triumph of simplicity, an admirable order and well establisted rules; the Revolution, food for heroism in the cult of the great men of Plutarch. To-day, the art of the ancient Hellenes shows us the perfect equilibrium; and with the cult of the harmonious lines of the human body, the natural and sincere love of the beautiful; in the same way, as that which concerns music, Gounod seems our precursor. He was also a believer, a mystic, but without the least asceticism. Yet his art does not express anything of sensuality. Quite the reverse, it is essentially sentiment and one might make the same remark of those that, after him, were great by the charm of their compositions, Fauré and Debussy. Apart from Berlioz and Gounod, French music, until about 1860, had somewhat slumbered. The composers, over whom the influence of Meyerbeer triumphed, often only succeeded in producing superficial operas, full of affectation, the transient reputation of which could not mislead. As to the comic opera, although, since Grétry, at times delightful with Boieldieu ‘The Woman in White’ and Hérold ‘The Clerks’ Meadow,’ it eventually quite degenerated; the same is to be remarked of Auber, *Ad.* Adams, V. Massé. It has been brilliantly revived in our day. Moreover this style, qualified as eminently national, only represents a very small portion of French music.

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* For instance, read again the admirable melodies of Venice, an astonishing and complete synthesis.

The generation immediately following that of Berlioz and Gounod, fostered by vigorous and classical studies, finally comprehended all the beauty of the symphony. Since then, this favorable movement was no longer to be stopped. It will be but right to state here, that the ancient German masters pointed out the way to a more closely serried technic. The example of Beethoven, also that of Mozart were precious, but still more that of J. S. Bach. In art, we have never approved of, nor practised, absolute protectionism, esteeming on the contrary that interchange is beneficial, provided it is not prejudicial to the natural gifts of the race. Now, French music has not been without submitting to several foreign influences, but by a harmonious fusion, they have only helped to maintain its national originality; it is thus, that rich natures borrow of one another. Our school is no less great nor French, for having found in J. S. Bach the real traditional style of polyphonetics. This style of Bach's directly linked to that of Purcell, Buxtehude, H. Schütz and more anciently, of Gondimel, and the Franco-Flemish masters of the 16th century, Gounod understood how to discover its beauty (as his commentaries on the chants of the grand cantor testify), at about the same time as Lalo, Saint-Saens and Cæsar Franck. The latter,[*] the first with Berlioz, sees far and wide. But the admirable hidden life of Franck is nothing more than an effort toward the best, and this great master meditated long in silence, seeking his own calling, the right direction of his thoughts; it was only much later he “realized” that he had reached his aim.

Even before 1870 tendencies, at the same time very serious and purely symphonic, were affirmed. Already the first compositions of Saint-Saens (this delightful trio in F dates from 1865) testify to those gifts which were bestowed on him, if one may say, from the cradle: an exceptional surety in writing and scoring, which characterizes the ‘Deluge’ and the ‘Symphony for the organ.’ There is also manifested in it, that which Berlioz calls “a lack of inexperience,” a word at once paradoxical and profound. With Saint-Saens, indeed, the perfect assimilation of the past prevails over that of the spirit of independence in respect to tradition (otherwise not at all ignored), which, on the contrary, influences some of our young masters, and that doubtless explains his unrelenting attitude as regards chance discoveries, however beautiful and logical of our contemporaneous school. Edward Lalo, molded by a thorough knowledge of the classical quartets for stringed instruments, moreover endowed[*] with a remarkable sense of rhythm and of the picturesque (can that be attributed to his Spanish origin?), was equally one of the best symphonists that saw the debut of this Renaissance. His part was important, none the less in the influence of his orchestra, than in the value of his compositions, such as for instance ‘Namouna,’ the originality of which and a certain harmonious boldness of style, caused the failure too often reserved to innovators.

All this musical progress was not checked by the tragical events of 1870, quite the contrary. The admirable score of the ‘Beatitudes’ is known to have been completed by Cæsar Franck during the siege of Paris. In the face of so much misery and sadness the soul of the great musician sought refuge in the word of the Gospel, and found there the accents of divine consolation. His first disciples had already comprehended the beauty of his lessons and example. Alexis de Castillon, dying too young, before he had been understood by the public, left an incomplete work, no doubt, but in which there is to be found great nobility, sustained by a pure musical taste, as that of a very sure calling. More distinctly still H. Duparc was a precursor. It is not to be denied that, at times, one meets with signs of genius in his works. Are we astonished to see this word attributed to simple “melodies,” to short and unpretentious compositions? The absolute scale has nothing to do with the matter; certain Japanese engravings would always be of more worth than a large but common-place “historical picture.” The profound and mysterious beauty of the ‘Invitation to travel’ escapes in the analysis. It is made up of well-known accords, the line is of the most simple, but thanks to the intuition of a great master, for the first time the nostalgia of Bandelaire enters into our art.

By Lalo, de Castillon, Cæsar Franck, Saint-Saens, H. Duparc and a few musicians of the theatre, to whom I shall subsequently refer, the impetus was given to the French school. The National Society of Music, founded in 1873, and which greatly favored the scope of our chamber music, seemed at its dawn to be the fraternal union of all the composers. Chimæra, on account of the free and manifold character of our school. The diversity of tastes led to several resignations, among them that of Saint-Saens. Later on, the schism of the I. M. S. (Independent Musical Society) was equally the resulting logic of analogous causes. Like the heresies which marked the most flourishing epochs, these rivalries and strifes were inseparable from a rich and productive art.

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[*] Three trios, op. 1 (1841).

[*] He had filled the modest part of alto in the Armengaud quartet.

At the time of its foundation the National Society numbered several musicians, the careers of which have since been principally theatrical. With their colleague symphonists they were then the «young» who were hopefully marching toward the future. And the public showed them that distrust, so often directed to new works, with which the author has succeeded in forcing an entrance into the Temple of Fame. It was thus that Reyer appeared too modern. His early works, 'The Selam,' 'The Statue,' displayed that love of the Orient, so natural with us. From the 'Persian Night' of Saint-Saens to the 'Marouf' of Rabaud, the French musicians have always been attracted by the charm and the distinction of the art of Islam. They did not compete with that (otherwise so captivating) manner of Rimsky-Korsakoff or of Balakireff, but adorned with discreet colors that which they showed to be essentially civilized (consult the translation of the 'Arabian Nights' by Galland).

Preceding Reyer, Felicien David had an hour of fame; a musician of disproportionate talent, carried away by a nostalgic remembrance of the desert and of whom Auber so wittily remarked: «I shall expect him only when he alights from his camel.» Let us not forget either the celebrated melody of Berlioz, the 'Captive,' impregnated with the romanticism of the 'Orientals' of Victor Hugo, and also call to mind that Bizet took part in this movement, 'The Pearl Fishers,' 'Djanileh'; Reyer waited a long time for celebrity, it came with 'Salambo,' especially with 'Sigurd,' of which we must, at times, remember the force, often the pure charm of the melodious thought and the sincere inspiration, issuing at the same time from Gluck and Berlioz. This celebrity George Bizet never knew. He died shortly after the failure of his admirable 'Carmen,' which Nietsche so justly designated as the accomplished type of Mediterranean art. A work essentially French in the widest sense of the word, where the imagination and the pathetic style is balanced by clearness and good humor. The musician (as already in the 'Artesian,' that other master-piece) reveals himself freed from the influence of the «grand operas» of Halévy. At the same time the counterpointed writing and the free dramatic style of Bizet were full of neologisms and daring: the public were therefore rebellious. But, now, this liberty is the current language of the young; scandalous at the time of the first representation of 'Carmen,' to-day it contributes to rescue it from the verdict of time, so severe toward some other more spontaneous and fashionable work. One knows of the misadventures of the 'King of Ys,' by Lalo. The directors of the theatres feared the incomprehension of the auditors, doubtless on account of the serious writing of this work, at the same time so clear and expressive. When Lalo finally became celebrated, he was quite 60 years old. «Who is this new young man»? they said. . . . Destiny was more favorable to Massenet, although much discussed from the first. The future will make its choice among the numberless works of this indefatigable master. The fairies who granted him their precious gifts (notably that of a distinctive personality and such musical charm) had added that of a desire to please; whence sometimes there appears in his works a transformation in his disposition.* It is found more purely, more profoundly expressed in some of his earlier works, simple but delicious melodies, orchestral series, ballet airs. Of a generous mind and a wise critic, Massenet was also a remarkable professor of composition at the Paris Conservatoire. There he directed musicians such as Bruneau, Charpentier, Rabaud, d'Ollone, Florent Schmitt, G. Enesco. His colleague, E. Guiraud, had the honor of including in the number of his pupils: Bachelet, Paul Dukas, A. Gedalge and Claude Debussy. Less illustrious than Massenet, Leo Délibes was still a delightful composer, many of his pages will never die. The young appreciate him so much the more as they find ideas for new harmony, that the art of Fauré and Debussy knew how to realize with so much perfection and depth. And his 'Lakmé' sometimes still enchants those souls thirsting for exolicism. With the first theatrical works of Saint-Saens (among which is the impeccable and really symphonic 'Samson and Delilah') is terminated this rapid review of the French opera and comic opera, before the Wagnerian influence and the kind of revolution which it caused. Truly speaking, the revolution was not so sudden, for the use of persisting themes had already been found in 'Samson.'

At the other musical pole were camped, at the National Society, a group of composers clustered round the professor Cæsar Franck. The latter (all his life one might say, if not ignored, at least unacknowledged by more authorized artists, and particularly by the musicians of the theatre) was of a modest disposition, humbly earning his living, far from all «arrivism,» desiring only to realize his sonorous dream; an enterprising spirit also whose linking of accords and personal style were little appreciated by his colleagues, with the exception of his pupils and a few other juniors. At the present time everyone renders homage to the angelical purity of his melodies as well as to the fulness of his noble thought. Goodness predominates in it, a naive goodness with a serene smile, which, without ignoring suffering, contemplates the world through the hope of his beautiful vision. Moreover, neither humanity nor passion are strangers to him, but he knows nothing of the bitterness of hatred. His art is inspired by the classical symphony, with, however, this very decided principle that the same idea begets the development and the form. By this independence, as also by the boldness of his harmony, so naturally free from all pedantry, Cæsar Franck remains one of the fathers of our modern school. Certain accents of divine consolation in the 'Beatitudes' seem to belong to all Christian humanity, more, to all suffering humanity. His example shows the beauty of the simple chamber music, and was a precious encouragement. But a curious thing which remains clearly defined, is the Northern origin* of Franck; this is particularly noticeable in the way his disciples understood his lessons. His amplitude of style, his calm but vigorous thought, as organist, are not without a certain heaviness in the realization; they, however, agree even with the idea. The full accords, the development which is displayed without fear of levying too great a stress, all these things do not displease us in Franck. It is not always the same with certain pupils; their noble intention «to live always on the heights» does not give the expected result, for lack of sufficiently fine musical ideas, or originality in the invention of means. Franck's means, having been discovered by himself, have a true accent, they are adapted to his own music. The art of his disciples of the present time, especially, seems, to us, in general, duller and more diffuse. It was also burdened with a fairly strong dose of pessimism. At the most active period of the Wagnerian influence a great wave of sorrow, proceeding from 'Tristan and Isolde' burst, threatening to submerge all familiar art, joyous, serene and confident. More than one of us believed himself called upon to sink into the bitter delights of this magic tide. Still, when this style of expression was *natural* to the musician, the works created under this Saturnian attraction are really fine. It was the case with Ernest Chausson. A great melancholy hovers over all he wrote; but it came from the depth of his heart. That is why the 'Funeral Song,' the 'Poem for Violin,' the 'Vedic Hymn,' and many a melody on certain poems of Verlaine, of Maeterlinck will never cease to move future generations. They *are* and they will remain.

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* A kind of exaggeration in the trait and in the sonorousness, in view of obeying the laws of what he held to be "Stage illusions".

The fashion for sombre, motionless and gloomy music yielded, most fortunately, to a reaction, instinctive to the race. Some fought against pessimism by the vitality of rhythm, others by the charm and the light. It would seem that, to-day, our younger musicians benefit by these two victories at once; and it speaks well for the splendid vigor of our contemporaneous art. The musicians of the Franckist school,† the first who took part in this reaction, are Ch. Bordes, A. Magnard, d'Indy, Paul Dukas. The characteristic of d'Indy's disposition is to consider *energy*, which in his works is quite clearly stamped by the force of the rhythm. Whence the best of his influence. Moreover, he often seems sustained by the rhythm, the principal subject of his music. And those of his compositions which testify to these qualities the most ('Symphonie with piano'; 'Wallenstein') are also those which reunite the highest expressions of admiration. The name of Ch. Bordes, too little known, merits to be joined to that of his friend and associate of the Schola Cantorum. It is known what devotion and what portion of his too brief life he consecrated to the work of the 'Chanters of Saint Gervais,' reviving the vocal art of the 16th century. But one ignores, in general, that he was a composer of delightful ideas, naive, fresh and sincere, occasionally picturesque and always exempt from pomposity. Paul Dukas is connected with this Franckist group, although he came from the Conservatoire. His works, in the main, so traditionally written denote an accomplished science, a manifest will in the writing, an orchestral perfection often to be compared to that of Saint-Saens. His musical personality may seem made up of divers elements, otherwise solidly united. But his most dominant feature is doubtless that vigor of rhythm and development which is admired in the finale in his 'Variations' on a theme of Rameau, as well as in certain pages of 'Ariadne' and 'Blue Beard.'

At the time of the German invasion in September 1914, Albéric Magnard was killed under tragical circumstances. Of a sincere mind, strong and sensitive, above all a lover of *truth* — a noble-hearted man, his music bears witness to his qualities. In my opinion his true personality is found outside the traces of the teaching of the Franckist and the d'Indyist groups. Magnard's style is somewhat that of a classic; it is quite anterior to that of our young school. A priori, he distrusted the harmony (yet, sometimes so pleasing) of Debussy and his successors. His resources are those of Beethoven, Wagner and Cæsar Franck. He declared in his preface to 'Berenice': «My score is written in the Wagnerian style.» He feared the presumption of appearing to create a new style, and kept as models the primitive masters of former times, good, naive artists who cared only to resemble their master. Most fortunately, however, and in defiance of them, when the instinctive personality commanded, they infringed on the discipline of strict imitation. Magnard did the same. In spite of the outwardly Wagnerian form, his music, in general, is that of ours. He had the love and the profound spirit of his native land that impelled the resistance in which he found his death. And this love discloses itself in the most personal of his pages, the best. The rustic enjoyment, the mirth somewhat rough of the dances which formed his 'Scherzo'; the familiar beauty of the French landscape when evening draws near, and the blue smoke rises from the old thatched cottage into the calm air, and the pure, limpid sensitiveness of a noble and tender soul, those were the accents of an absolutely original emotion which he interpreted. Verily, Magnard is one of our first and best symphonists.

Outside the school of Franck, the rhythmic reaction had several promoters. To-day appears to us the grandeur of the work of an unpretending artist to whom we must give a proper rank as historian and composer: Bourgault-Ducondray. His lyrical drama of 'Thamara,' on account of its very fine scenes, deserves not to be forgotten. But, especially, let us call to mind the class on the history of music, so new and interesting, that he gave at the Paris Conservatoire. By this means, he forcibly helped the revival of the modern Greek, as well as by his transcription of the popular songs of Brittany. These ancient gamuts* after having been forgotten for nearly 200 years, seem to have been remembered by our French music, in order to realize certain archaical or naive coloring (for instance in ‹The Childhood of Christ› by Berlioz). But gradually the ear again began to understand and love them, realizing all the beauty to which they might be the support. Cæsar Franck and above all, Chabrier, Fauré, Debussy came at times to think naturally by means of these gamuts. They are written to-day in as fluent and instinctive a manner as the classical major and minor. Our art inherits a priceless antique treasure, the language of contemplation and mystery. And the old Celtic groundwork of our soul finds again, in song, the modes of Brittany of ancient times. At the same time (and to begin with Chopin who was the first to proclaim the splendor of the starry night of which the classics thought so little, and which is adored by modern music) was revealed the grandeur of the Slavonic dream, the vast domain of which extends from the popular airs purely Russian, to the chromatic melopoeias of the Musselman world. The *Andantes*, so exceedingly nostalgical of Borodine, the dancing choruses of ‹Prince Ygor,› ‹Thamar› by Balakireff, ‹Sheherazade› by Rimsky, then finally the truly genial work of Moussorgski (by reason of his audacity, he was long considered an amateur). What glimpses of new horizons! These diverse elements are harmoniously dissolved in the crucible of our national genius. It established the strange light and the dreamy charm of the Slavonic art, as it had «naturalized» the use of the antique modes; it retained from Islam the fancy for the supple arabesques and had not forgotten the Javanese music (so refined in the tone of its accords) which enchanted us at the Exhibition of 1889. Enriched by such means, improved by the profound studies of harmony and the practice of the counterpoint of J. S. Bach,— to the beneficent emanations of poetry and art, the domain inherited from Berlioz, Gounod and Cæsar Franck saw marvelous new plants blossom with bright, sweet-scented flowers. The reaction of the sun on the dark pessimism that I have described was the work of Chabrier, graceful elegant, candid, sincere and charming;— of G. Fauré, whose pure art evokes that of the painter of Ombrie, so Greek in ‹Penelope,› so profound in his imperishable melodies from which the true nobleness (to the contrary of hypocritical common prejudice) of the soul of Verlaine is released and lastly Debussy, whose ‹Prelude to the Afternoon of a Faun› came like a thunder-bolt, in 1892. The first of modern musicians, these three masters revealed to us a clear and measured art, really «Mediterranean,» thoroughly French.

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*Cæsar Franck was born at Liege (Belgium Wallon) became a naturalized Frenchman and lived almost always in Paris.

†I mean by this term, not only the direct pupils of this master, but those who frankly submitted to his influence.

* Which are also, we have remarked, those of the art of the Gregorian Chants.

Emanuel Chabrier, so truly original and to whom our school owes so much, offers the example of a very free artistic nature, very naive,— superior on the whole: to have the downright courage to affirm and to write whatever one likes, no matter the subject and the character. His natural good nature, rich in enthusiasm and tenderness illuminated the music with happy joyous rays. Its greatest charm is, not only the pleasing sonorousness, but especially a simple mindedness, just and good. Some critics only grant him the genius of the comic art: a very narrow judgment. Without doubt Chabrier was a wonderful author of parody (‹The Star›, and, ‹The King in Spite of Himself,› are in a way master-pieces) but he was also a refined artist, a lover of musical beauty and of the picturesque. He showed, if one may say so, an entire lack of pedantry. Coming from the operetta, one discerns in this unassuming artist a charming resignation to be only what he is. In other respects, by his melodious liveliness, his discoveries in harmony and the charm of his personality, he seems to me greater than one would imagine. If he were free with regard to subject, no one more than he was more submissive to the reasonable claims of the ear. But while satisfying, for his own pleasure, the secret instinct of that ear, he justly respected the true rules of art, those hidden, mysterious principles, moreover infinitely varying with the works, and which the intuition of the artist alone knows how to obey. In this way Chabrier acquits himself of the first duty of every musician, as our young French school understands it to-day.

Very different from Chabrier, the same cult of the sonorous beauty, the same very frank, decided will to write whatever he likes, also characterizes G. Fauré. His most uncommon gifts which have sometimes made us say (as of Gounod) that he is «music itself,» combined with such exquisite taste and prophetic imagination. G. Fauré is one of our greatest masters. His art is like that of the ancient Hellenes, of an entire purity, discretion and harmony, not excluding, however, depth and penetrating charm. The construction of his phrase is really inimitable. In order to define these words «Fauré's way» you might as well crush the marvelous wings of a butterfly between your benumbed fingers. One cannot explain the great and delicate mystery of the ‹Arpeggio› or the ‹Moonlight.› Let us only state, on the whole, that this class of music is the most faithful representation of the sentiments uttered by the poets. A portion of Fauré's works is known to consist of unrivaled melodies, written on the verses of Verlaine, Samain, Leconte de Lisle. The material dimensions matter little, a simple melody which is really beautiful like the ‹Imperishable Perfume,› is worth more than a series of tedious sonatas. On the other hand, let us acknowledge the power of charm (a dangerous error to think the expression of brutal force more powerful). Here, this charm is the Latin, ‹Carmen› and there is a magic in this music, so mysteriously, so entirely musical. Besides, it did not require much to make Fauré's song heard with still greater force. He seized the opportunity and conquered. His ‹Prometheus,› at once simple and concise, shows splendid vigor. His ‹Penelope,› of a wonderfully Greek art, interprets the eternal humanity of the old Homeric legend.

This style scarcely offers anything else but known accords, linked, however, mostly by «exceptional resolutions» very new and altogether characteristic. Debussy, likewise, makes use of many new «linkings.» But let it be distinctly affirmed that he possesses all the fine qualities of a French classic. If he be essentially of our epoch (in order to give a more just expression to contemporaneous appreciation, no one ever appeared so precisely at the right moment), if, by this happy concordance ‹Pelleas and Melisande› (in spite of so much that is surprising in the style) called forth numerous and sincere commendations, it is none the less a perfect classical work. At the present time we discern in it that good sense which knows how to reserve its means; one enjoys the soberness of the writing and scoring.

It is false to say that ‹Pelleas› is a «continuation of perpetual dissonances.» These latter are realized with an extreme softness, and attached to them, perfect accords play an important part. Those who remained bigoted followers of Wagner, judged that there was nothing in ‹Pelleas› precisely on account of that conciseness, that admirable fact, and because Debussy made use of no long developments in order to interpret his thoughts. The art of Moussorgski had revealed to him by what genial curtailings the author of ‹Boris Godunoff› knew how to depict such a sentiment or vision. He drew from it the boldness to free himself from all restraint as regards rules, every time his natural instinct demanded; the law of all original beings from Monteverdi to Beethoven, from Bach to Stravinsky or Schönberg. This instinct, so sure, combined with the good fortune to have known Stephane Mallarmé, and his associates, had guided him to a new study of books, precisely those charming «little dramas» of Maeterlinck. His direct interpretation of nature has caused Debussy to be classed among the «impressionists.» And those who only half appreciated him readily add «particles of sounds, contempt of all construction.» This is a very correct opinion. The scenes of ‹Pelleas› especially are well combined, because an impression of unity proceeds from them, of harmonious lines, and because the form is exempt from tediousness. Study the ‹Prelude to an Afternoon of a Faun› the ‹Nocturnes,› ‹Iberia.› You will be convinced that it is not a question of «sonorous dashes» set down by chance. It is the freshness of a sketch in front of the landscape combined with the quality of the pictures of finished composition. Lastly, like Chabrier and Fauré, Debussy has never looked upon the charm of music as a faulty thing. And the neopaganism of this tendency has only that which elevates it. It is none the less opposed to the materialism of the theatre veritist than to the scholasticism of misunderstood tradition. A pantheist, he adored, as divine, the beauty of the material, or if one prefers, he decks it with all that is divine in man, that is the exact opposite to commonplace art.

In France, at first, and for a few years in foreign countries the repercussion of this music has been considerable.

‹The Pavan for a deceased Infant,› by Ravel, at first appeared confusing; it strikes us to-day by its classical and regular beauty.

After ‹Pelleas,› all music, irregular, new, unexpected, seems Debussyst to the ears of critics. As such was entitled at the first hearing, the vigorous and sonorous ‹Psalm› of Fl. Schmitt, so remote from the ‹Nocturnes› or ‹Iberia.› As much was said of Ravel's ‹Imitations›! Nothing is more unjust. Relationship, influence, be it. But before all, let us consider the general course of events, the state of the mind, of art, of literature, the preceding chance discoveries of our masters, the music of the «Five Russians,» the need of natural reaction against the factitious research for expansion, these are many of the reasons which are at the origin of the *means of expression* of Debussy, as of Ravel. The charming ‹Elegy› of Raymond Bonheur may remind us of some expressions in the ‹Chosen Damsel›; it would be absurd to see a «copy» in it. (The real copy does not exist in music and plagiarism only ends in tame repetitions). One hears also in the earlier works of Erik Satie (especially in the ‹Son of a Star›) some curious «parallel movements» which it is possible Debussy and Ravel kept in mind. Moreover, every artist must possess some *genuine originality* in order to be inspired with success by the chance discoveries of a colleague. Thus Wagner acquired certain harmonies from Liszt; Debussy does not ignore some pages of Monssorgski. But the result of it was beauty and of quite a personal kind. If young musicians, in their turn, have walked in the footsteps of Debussy (continuing in case of need to venture into the pathways, the starting point of which he has pointed out) it would be foolish and wrong to quarrel with them. The whole history of art is composed of rich and fruitful influences, terminating in original works; and we have only to judge by the results.

The history of the Debussyst revolution is then only a natural episode of the onward march of our musical art. The origin of this progress dates from more than 20 years, and this lapse of time permits us to measure the fulness of its effects. We now perceive much better, that a refined harmonious elegance does not exclude, either a sound musical condition or even force an intense expression (quite the reverse), or the simplicity of the whole which includes many more mysterious reasons. And this irresistible thrust was the last assault against the fortress of «false dogmas.»* We can thus make the enumeration.

1. Rules of harmony prohibiting certain linking of accords; certain arrangements of successive seconds, fifths, sevenths or ninths; false connections, appogiaturas or retardations heard with the true note, irregular resolutions, etc. Contemporaneous scoring has definitely acquired liberty; but it is easy to find many a derivation from these rules in Palestrina, Monteverdi, Bach, Mozart, Beethoven, Chopin, Cæsar Franck, Gounod, Bizet, Saint-Saens, Bruneau, Chabrin, Moussorgski, Borodine and more recently Fauré, Debussy, Ravel, Schmitt, etc. The right to these liberties is then ancient, classical and just. They have formed the subject (with some examples taken from the French school) of a remarkable book by René Lenormand ‹Study of Modern Harmony.› But this is only a small portion of the license, so necessary, taken by our music which, from all sides, breaks through the too narrow restrictions. Let us note also:

2. New views on the tonality and on the modulation. The ancient Greek modes serving as the natural expression of the phrase; the modulations written with great independence: some pieces exist which have no longer the unity of tone of past times, but keep a continuation, a cohesion, an incontestable musical logic (moreover, we must call attention to the importance accorded to the unity of sentiment of our day).

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* Let us remember here the exceedingly interesting work of our colleague John Huré, ‹Musical Dogmas.›

3. Liberty of rhythm and of melodies. Disappearance of the prejudice of the "width" sometimes even of the bar of measure. Rhythms varied and animated as in those of blank verse.

4. Liberty of the symphonic style which may adapt itself to anything else than to the scholastic development, called "First pieces of symphony."

5. Finally, the very accurate idea, that the magnitude of a work is not measured by its *material duration, or its sonorousness,* neither to the more or less forcible hold of the rhythm, but to the beauty, the elevation of the idea, and to the harmony of its development; the whole being only a matter of proportions.

The history of the French symphony has made us temporarily abandon that of the theatre. But at the present day our best musicians make no absolute distinction between these two acts. The theatre adapts itself very easily to a symphonic style, as a proof, that of Mozart. In every instance, good music is necessary and no exigency of scenic action would excuse bad music.

In what might be called the "theatre of the soul," the first example was given to us in the 'Dream,' by Alfred Bruneau, the music of which, so sincere and faithful, interprets the emotions of the heart in a language which is not out of date. Under the influence of Zola, Bruneau has since reverted toward a broader style of art, of great force in 'Messidor' and in the 'Hurricane,' but the 'Dream' marks a fortunate date in our musical history. Much discussed as its origin, it remains a model of which more than one will be inspired. Notably Charpentier in his 'Louise,' certain pages of which have lost neither their ardor nor their beauty. I have somewhat lengthily described the music of Chabrier, in order that one may deduce from it the praise of 'Gwendoline' and of 'Briseis': the same that of 'Guercœur' and of 'Berenice' by Magnard, not forgetting the dramas, so convincing of d'Indy, who wrote the fine poems in them: 'Fervaal' and 'The Stranger' of which certain people are great admirers. Lastly, in a style, concise, measured and chosen, 'Pelléas and Melisande' indicates the hour of definite reaction against the influence of Wagner; and, like the 'Dream,' shows the nothingness of the Meyerbeerian conception of the "exterior theatre." The true road (that of the tradition of Gluck and of Monteverde) was traced by the garden act of 'Faust' as well as by many scenes in 'Boris Goduno' (q.v.). For that reason, our finest lyrical contemporaneous works all obey this careful observation of *musical quality*, and of the accuracy of the sentiment. This does not at all exclude the rhythm or the vitality, examples: the splendid drama of Paul Dukas, 'Ariadne and Blue Beard'; the touching 'Daughter of Roland' of Raband; the charming 'Heart of the Mill,' by D. de Severac: the masterful 'Macbeth' of Ernest Bloch. Moreover, symbolic or otherwise, the form of the book matters little. A simple adventure could be a link to very fine music, for example, the 'Brief Life' of M. de Falla, a young Spanish master very justly esteemed, who has lived during the last few years in Paris, where his pieces were performed; and again those of Laparra, the 'Yola' and the 'Habanera,' of vivacious and characteristic character.

In this history of our modern art the comic theatre merits a place apart, none the less from the value of the works than the tendencies which they announce: the conception of purely musical laughter. The operetta and the former comic opera aimed still more at agreeable music, amusing, gay, superficial on some occasions; and the laughter sprang from the text, from the performance of the actors, more than from the musical style of interpreting the inner sentiment of the character; scoffing, bantering, or ridiculous. And that is quite a new notion for the public. 'The Star' of Chabrier, had no success: an admirable parody, the comic of which was not discerned (yet, intense, and so evident to cultivated ears). Besides, this peculiar language of music, from which the smile is born and out of which springs laughter, some examples are already met with in certain pages of the "King in spite of himself," in 'Carmen,' in the "King has said it," by Leo Delibes, in 'Phryne' of Saint-Saens, even in 'Madame Angot's Daughter' by Charles Lecocq. Whatever may be the cause, musical comedy is not yet completely realized, in which the composer closely follows a poem from real life (as the author of the 'Dream' and of 'Pelleas' have done in the domain of tragedy). But these last few years have seen two very interesting attempts due to musicians of the highest order, 'The Spanish Hour,' by Ravel, and 'Marouf,' by Rabaud. The music of Ravel is the exact interpretation of the parodic and fantastical humor of the poet Franc-Nohain. The seriousness of an inperturable dry-jester, the precision of a highly lucid mind, a historiographer of puppets, an insinuating style of an irreproachable appearance; all these form an entire assemblage of the most characteristic and novel kind. The inimitable 'Stories from Nature' (prose by Julius Renard), already asserted that sense of the comic in Ravel, of an imagination, so apart, and which to be appreciated at its true value, demands a real musical culture. In 'Marouf,' Rabaud superbly revives the comic opera, transfigured, thanks to a masterly symphonic style. The real musical comic is revealed more than once, the talent beyond comparison of the principal interpreter, G. Perier, completes the whole. The ampleness of style is not prejudicial here to the equilibrium of the proportions, nor to the gaiety; and the oriental coloring, never monopolizing or artificial, is harmoniously blended with the music itself. It goes without saying that in this general review and considering the richness of our school, a great number of our talented composers cannot be studied here. Let us not omit, however, a few of the predecessors of Rabaud, notably Messager, with his amusing and concise 'Basoche,' and G. Pierné in his 'Tabarin's daughter,' as well as in his witty songs, or still more so his "Scherzo" of the 'Year one Thousand' in which his disposition is happily exhibited. Midway between the drama and the comic opera, 'Ascanio' and 'Proserpine' of Saint-Saens are perhaps since 'Samson and Delilah,' the most successful theatrical works. The charm of the pure lines of the Renaissance is found there again. As to the lyrical dramas, if we cannot name all let us remember the 'Country,' of Guy Ropartz, the 'Forest,' by A. Savard, 'Scemo,' by Bachelet; the 'Return' by d'Ollone, who follow the action with faithfulness, earnestness and with a well sustained musical skill. Thus a tendency toward music for the theatre became generalized, which ought to be, first of all, *music.* Classifications, even logical, are never absolute, and there are some artists who remain isolated. The Celtic school forms a separate group. These are musicians (for the most part natives of Brittany, Irish or Welsh) to whom, at times, the consciousness of their inheritance, reveals that the Latin culture (they think so) has left no durable traces in their Armorican souls. They go to the fountain head of the ancient airs of Brittany: such as Guy Ropartz, whose 'Country' testifies a profound love of his native land; Ladmirault, Duhamel, Paul Le Flem who transcribed some popular songs or were happily inspired by the moor and the forest of Brittany. And we can connect with these John Huré, a fervent admirer of the Geogorian chant, and the ancient modes.[*] A few French provinces have their own languages. We have mentioned the Basque airs of C. Bordes; the same corner of French soil is evoked in the 'Trio' of Ravel. D. de Severac is faithful to his Languedoc; Paul Lacombe (of the generation of Saint-Saens) is inspired by the radiancy and the happy philosophy of the South. The familiar muse of F. Berthet, sensitive as much as restrained, retains the beloved memory of the friendly slopes of the Beaujolais; that of Dupin shows that he has been brought up under the misty skies of the North, in the atmosphere of country fairs: a «popular» musician in the best sense of the word. The soul of the humble, of those whose lives are hard, resounds in his voice, resigned and dignified, wherein mutters a great spent force, breaking out into violent explosions, sometimes into gaiety and enthusiasm. Fanelli precursor, in many respects, and whose 'Pastoral Impressions' contain some real beauty, cannot either be classed in a very definite manner. Lastly, a few composers — more often organists — attracted by preference to sacred music, also remain in a way isolated — as Tournemire whose forcible and high class work (note particularly his VI Symphony) are not of those that will pass away. There were often strifes between such groups. It would be wrong to deplore them; they show the free vitality of our art; as a tree of vigorous sap branches out naturally. Likewise, one remarks with us some logical schisms which are inevitable. The National Society after a first breach (departure of Bizet, Massenet and Saint-Saens) saw also the detachment of the Independent Musical Society, «I. M. S.» at the same time in which the National Society seemed to assemble and to play, especially, the works of the pupils of the Schola Cantorium, where the principles of teaching were applied by d'Indy. The I. M. S. invoked rather the general ideas of Moussorgski and of Debussy, their style being equally directed toward the music of Chabrier or of Fauré in preference to that of Dukas or of d'Indy. They thus comprised the greatest number of composers who had been enthusiastic over the conquests of the «Debussyst movement.» The rivalry of these two groups did not occur without exciting their energy; a great number of interesting works were heard (temporarily put on one side by the committees of the grand concerts Colonne and Lamoureux, always more timid in their choice); notably, at the orchestral recital of the I. M. S. the superb 'Psalm' of Florent Schmitt (this musician is one of the most influential of the younger generation, and his quintet has the force of some classical works); the last act of the 'Cathedral' by John Huré; a tableau of the 'Blue Forest' by L. Aubert; 'Gold by the Sea,' symphonic poem by the ingenious and spirited Delarges and the 'Vintage' by the author of this article, Charles Koechlin. On its part the National reveals the fine 'Evocations' of A. Roussel, a sensitive and profound musician; 'Margaret's Garden' by Roger Ducasse; and the Hasselmans concerts, the 'Heliogabale' by D. Severac. And a complete pleiades of musical directors, active, remarkable musicians, confident in the art of the future, such as, Ingelbrecht, Rhené Baton, P. Montense, Robert Schmitz, gave ample proof in the most brilliant manner. Aided by these societies (and by others which have sprung up since the war), the impetus of our present chamber music requires that we stop there. The characteristic of these recent works seems above all, *vitality.*

In conclusion, ancient Greece, far back in the ages, remains our imperishable model. But we perceive that at the present time, even the gamuts of her music have become familiar to our understanding, and that we are also penetrated afresh by the beauty of the Gregorian chant. Therefore, we may hope for a return to a higher sacred music, less theatrical and as it was formerly, more collective. The art which will resound in this manner, whether it be in the church, or in laical hymns at National ceremonies, will, moreover, have benefited by all these discoveries of the expression of a subjective and personal art; and the latter will none the less continue its vitality, whether in the theatre or in the symphony, also as in that which we call «melody» for piano and singing (with us so distinct from the German «lied»), or again in compositions of the same kind, but more developed, in which whole pages of prose would be interpreted in a familiar action, a «musical novel.» One sees the variety of ways in which our music may be handled with fresh resources. The present is a guarantee for the future. And this present is linked to the past, it continues and completes it.

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17. FRENCH ART. The Sources of the Renaissance.— Art in France, as in all European countries, emanated — in its two essential forms, sculpture and painting — from architecture. Frescoes and statues, exclusively of sacred legends, served to decorate the churches and palaces. It was but gradually — during the last five centuries only — that French painting especially, has been divided into historical painting, landscape painting, genre and still life, and that sculpture has, according to Spencer (who explains the evolution of the history of art by the law of differentiation), become «heterogeneous» through the variety of subjects, both realistic and ideal, of which it treats.

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[*] It is thus manifested in his exceedingly beautiful interpretation of a nostalgic popular Song of the Sailors of Brittany.

Mosaics play a prominent rôle in the decoration of basilicas, and later of Christian churches; Byzantine influence extended to iconography and to the miniatures in missals. The development of art, from the Roman churches of the 11th century to the Gothic cathedrals of the 13th century, attained unprecedented perfection. The sculpture of the cathedrals of Chartres, Amiens, Rheims and Paris — by their simple and exquisitely naturalistic forms — realized the highest ideals. The decoration of the façades and the portals, like a living encyclopedia, fully reflects the faith and the aspirations of an age of earnest religious belief. All the industrial arts, ornamental sculpture, cabinet-work, church windows, missals and goldsmiths' work, were in unison in the Middle Ages in France. The director of the work was, at the same time, sculptor and painter as well as architect. In the 13th century, French decorators turned aside from Byzantine rigidity and archaism (Sainte Chapelle de Paris, and Donjon of Coucy, the latter destroyed in 1917 by German vandalism). Then the workmen were employed in decorating the dwellings of the nobles. Charles V and the Duc de Berry exercised a great influence over the French school. The court of the Duc de Bourgogne vied with that of France in the magnificence of its arts; calling itself the great Bourguignonne school. The Chartreuse de Champniol near Dijon, is the most significant example. On the other hand the works ordered by the popes during their sojourn in Avignon were not without their influence on French decorators, bringing them in contact with Italian artists.

Jean Fouquet, a portrait painter, limner and fresco painter, connected with the court of Louis XI, made this progress still more apparent. Jacques de Litemont decorated the chapel of the house of Jacques Cœur in Bourges. The sojourn of the court on the banks of the Loire brought a great many artists to Touraine and those from Italy brought with them the new lessons they had learned from antique art.

Jean Bourdichon of Tours and Jean Perréal, brought back by Charles VIII when he returned from his expedition to Naples, rivaled the ultramontane artists.

With Francis I Italian decoration and style reached their zenith: at Fontainebleau, the king placed a great many painters and artists skilled in stucco under the direction of Primatice, which resulted in the beautiful gallery of Francis I — one of the most perfect «ensembles» that the Renaissance has produced. Under Henri II and Catherine de Medici the school of Fontainebleau followed their lead. While French architects and builders attached to the kings of France erected the Chateaux of Gallon, Blois, Vendôme, Chenonceaux, Fontainebleau, Ecouen, Anet, Chambord and lastly the Louvre and the Tuileries, which have made the names of Pierre Lescot, Philbert Delorme and Jean Goujon illustrious, their wonderful tombs and fountains are to be seen everywhere. Conspicuous in French sculpture are the names of Michel Colombe and of Ligier Richier, and later, in the reign of Francis I, that of Jean Goujon (who was the first in France to do bas-relief), and of German Pilon.

The 17th Century.— During the great expansion of the Renaissance, wherever the influence of the Clouets (portrait painters of psychical insight) predominated, French art maintained the greatest independence, notwithstanding the official pressure brought to bear in favor of Italian art. At the end of the 17th century, art had but one head — the king; and he expressed but one idea: absolute power. French art became monarchical, reflecting the absolute majesty of the sovereign, and his servile flatterers, who could and did say of the state: «It is I.» It was now necessary to have a dwelling proportionate to these excessive pretensions. Architecture, painting and sculpture basked in the sunshine of royalty. It is not quite natural for people to submit to such rigid rules. Even the gardens became monarchical in style, everything was imperial, theatrically pompous; then followed the portraits of a Rigaud, a Nateuil, and even the pompous divinities in the garden of Versailles. The methodical minister, Colbert, formed a comprehensive plan for the protection of art. François Mansard, who built the palace of Mazarin, was imitated by Claude Perrault who constructed the splendid colonnade of the Louvre; and above all by Hardoin Mansard, his nephew, who designed the palace of Versailles, and the chapel and the dome of «Les Invalides.»

Sculpture, in its turn, was held in leading strings. Girardon Coysevox, Nicolas Coustou and Lemoyne designed great works along these lines. It was only the genial Pierre Puget whose ardent and passionate temperament would not yield to discipline. Thus he lost the favor of the public, who leaned toward the style of LeBrun in his great decorative enterprises. It was these artists who peopled with marble Versailles, Trainon, Marly and Saint-Cloud.

In painting there was the same love of display, except in the works of the Le Nain brothers, who portrayed the peasant. Simon Vouet, in the reign of Louis XIII, ushered in LeBrun. Nicholas Poussin, whose style in historical landscape is unsurpassed, lived in retirement in Rome, where he formed the style of Claude Lorrain — a wonderful analyzer of light,— aside from this movement in which even the austere Philippe de Champagne and the suave Le Sueur took but little part, LeBrun is the artistic spirit of the 18th century in France. The position of Director of the Academy having been created for him, he grouped the artists as he wished. To him is due the stately gallery of Apollo in the Louvre, and his artists Lemoyne, Monnoyer, Audron, Berain, Bourdon, Coypel, la Hire, Jouvenet, Van der Meulen, Regaud and Largilliere painted portraits in a wonderful dashing style. Decorative art reached its apogée in the Gobelins manufactory of tapestries supported by the government, and in the cabinet work of the Boule family.

Exceptionally original talent was now seen in engraving — that of Jacques Callot.

The 18th Century.— A very natural reaction from the pompousness of the 17th century resulted in the piquant grace and the sensuality of the 18th. Caprice and subtle delicacy took the place of dull etiquette. «Prettiness» replaced «the Beautiful.» Art declined. The «Rocaille» and «Folies» styles succeeded. Nevertheless Gabriel, the architect, did not as yet abandon the deep-rooted traditions of his predecessors which he embodied in the façades of the Palace de la Concorde. Soufflot, in the reign of Louis XVI, inspired by antiquity, built the Sorbonne in that style. But architectural style now aimed rather at «comfort.»

Sculpture was flourishing, after the style of Jean Baptiste Lemoyne. Two eminent sculptors, Pigalle and Houdon, partially escaped this craze, especially Houdon who made such a powerful bust of Voltaire. But the idol of the boudoirs was the voluptuous Clodion, whose very worldly creations seem to be caressed by the hand of Love itself.

Painting was in every way typical of the taste of French society in the 18th century. The pastorals of Franc Boucher; the fascinating «Fetes galantes» of Watteau; the charming nudes of Fragonard, sounding the praises of woman; the great Chardin, a man of the middle class, who escaped the false manner of his time, which engulfed Joseph Vernet, Hubert Robert, Oudry, Lancret and Pater, painters of marines, of landscape, of the chase and of gallantries; the sentimentality of Greuze and the archness of Madame Vigee Le Brun are offset by the keen penetration of the portrait painter Quintin Latour, a capricious pastel artist.

The 19th Century.— Another reaction took place. David revived the ancient Greco-Romano, and his horror of the license taken by Boucher led him to adopt a very severe style of art. His influence on his time was great. The David school, which had its origin in the painting of 'The Crowning of Napoleon I,' includes the names of Drouais, Girodet, Gros, Guerin, Gerard, Leopold Robert and also Ingres.

Jean Dominique Ingres detached himself completely from the heroic style of his master. He was a forcible and skilful draughtsman, psychological, intense, a sensual «feministe,» and excelled the fascinating founder of French Classicism, but like him he confined himself to an ætheticism which sprang from his «esprit» which was inferior to his temperament. The gentle and pure Prudhon was inspired, as well as David, by antiquity, but from a different point of view, that of vague dreaminess. Romanticism made its appearance with Gericault, the spirited and bold colorist of 'The Shipwreck of the Medusa.' Romanticism, therefore, burst forth with a flourish of trumpets. Delacroix made his appearance,— lyrical, agitated, masterly and ever restless, an excellent colorist and a dramatic pessimist: he is Byronic, reminds one of Berlioz, ranks with Shakespeare and anticipates Wagner. Songeur Fulgurant is the embodiment of lyric art separated from schools and epochs. Almost at the beginning of the century Delacroix foretold the end. He was ignorant of the broken tones, which had been slightly discerned by Andrea del Sarto and Watteau,— the theory of complementaries as applied to pictures. This resulted in Delacroix being (1830) fully imbued with the Impressionist revolution which developed toward the year 1865. The feverish earnestness of his great spirit enabled him to surpass Ingres, produce a contrary current throughout the entire country,— a stiff breeze of independence. He repudiated codes and dogmas, and taught that the law of art is the scrupulous cultivation of individual expansion.

The struggle between Classicism and Romanticism was violent, and it soon gave place to another enemy — Realism. Romanticism spontaneously engendered from the soil an admirable school of Romantic landscape — Theodore Rousseau, who set his skies aflame as with precious stones and blood; Daubigny, self-contained and affected; Troyon, an animal painter as vigorous as a Dutchman; and Dias, florid, the votary of a muse too studiedly grounded. These landscape painters, followers of Ruysdael and of Claude Lorrain, possessed — besides the qualities of these masters — great keenness of perception, and the new theory of the vibration of color absorbing the contour without losing the form; and laying less stress on the drawing of the trees and hills than on the feeling for open air values.

And now comes the line of Romantic Realists instituted by Decamps, the Orientalist; these will continue in Marilhat and the dainty Fromentin, one of the most limited in range of any of the artists of the Romantic school, and also Daumier, a superb worker in black and white, who, in addition to his celebrated lithographs, did innumerable small panels which are very expressive, thrillingly tragic, and of a grand and sombre spirit. The Romantic realist Courbet — the grandson of the bitter Gericault — followed; then came Edouard Manet. Camille Corot, however, the follower of Poussin, bathed his scenes from Virgil in a diffuse, angelic and superb light. The damp, chilly charm of the morning, the veiled mysteries of the evening, are the themes he chose. Corot is a unique master in French art. He has a very fascinating, delicate and consummate charm. Another man standing alone is Jean François Millet, known as being the interpreter of the sad figures of peasants in the fields. Both belonged to the Barbizon school (q.v.).

Courbet modified the trend of Romantic art; he took the lead in realism, and was an artless, vehement and capable leader, forming his views directly from life, of excellent health and in the first rank of historical painters. His style was degraded owing to the influence of the followers of Ingres, and he was fully imbued with the spirit of Flandrin — the conventional and insipid painter of the nude,— and by Manet,— the Franz Hals of French soil. Round him are grouped Ribot and Bonvin.

At first under the influence of Velasquez, Goya and Franz Hals, Manet tried his skill and found the bent of his genius. He eliminated all bitumen from the palette, which left only the infinite combinations of the seven prismatic colors. He transformed Romantic Realism into a vision of modern life and was noted for representing the manners and customs of the second empire. He is not understood. The well-known and conscientious critic, le Cafouent, paid him tribute 20 years after his death. His 'Olympia' has at last been placed in the Louvre. Manet broke off all connection with the Impressionists, but before taking this important and reactionary step he restored to their rank two illustrious men who, in the midst of Realism, mark the return toward mystic dreaminess: one of them is Gustave Moreau who carried out the heroic and legendary ideals of Eugene Delacroix in the dreamy magnificence of the Hindoo palaces, in the luxurious hieratisms of Hebraic royalty and in the fabulous Hellas. He was a visionary idealist. The other one is Puvis de Chavannes, so long misunderstood, who is the greatest fresco painter of the 19th century, the author of Sainte Genevieve of the Pantheon, of the celebrated mural decorations of the Sorbonne and in the United States of the Boston Public Library. He was not only a great painter, but a great poet. Impressionism now became noted. This style, however, was followed by neither Fantin-Latour — devoted to Wagner and Virgil and an earnest and serene portrait painter — nor by Carriere — happily inspired to paint his Maternities in monochrome. To explain better the spirit of these designs let me say that Carriere did not permit himself the use of color.

Impressionism is a special study of light. Claude Monet, a fellow-worker with Manet, came into notice about 1867; he encouraged landscape painting founded on the vibratility of ambient light. The Impressionist school took its name from a picture by Monet, modestly entitled ‹Impression,› which was ridiculed. The name of this work so ridiculed became a rallying point. Luminous effects predominate in the vibrating marines of Claude Monet. His pictures (a series of cliffs, of mill-stones, of poplars and of cathedrals), copied at every hour of the day, all from the same angle, are different aspects of the same theme under the effects of the sun's rays. Monet employs the method of separating the tones; under his brush inanimate objects volatilize into iridescent and versicolored phantoms.

Near Claude Monet struggled Sisley, Renoir and Camille Pissarro, who immediately fell under the spell of the «Petits Maitres,» forerunners of the Impressionists, Boudin and Lepécié.

If Monet affiliated with Claude Lorrain and Watteau, Renoir followed the 18th century and Boucher, but a Boucher of a different power. Exceedingly appreciative of female beauty he embodied it in creatures charmingly natural and glad to be alive and he thus expanded only beautiful flowers of flesh under the rays of light, that they seemed to drink in at every pore. He was the great painter of the ‹Moulin de la Galette,› the gem of the Caillebotte Gallery, Luxembourg Museum. Berthe Morisot left a series of water-colors, exquisite, spirited and of refined taste, painted in a style between that of Manet and Renoir.

Alfred Sisley was like Claude Monet, with the exception that he laid much less stress on the experimental demonstration of a theory of art. His subjects, the environs of Paris, are noted for the quick and accurate perception and the light touch with which they are treated. Camille Pissarro sang, in a generous and frank spirit, of shepherds, market-gardens and Norman villages.

To these names let us add that of M. Degas, one of the most keen and least charitable observers of the life of to-day, a careful student of jockeys, an unkind humorist and a wonderful draughtsman; and also those of M. Raffaelli, the late Monticelli, Lebourg and Guilla.

The teachings of Impressionism, even though denied by the corrupt followers of Ingres, Cabinel and Bouguereau, who was greatly Italianized, and by Meissonier and Gerome, «Petits Maitres,» who lose themselves in minutiæ, are of advantage to the liberal minded. M. Besnard made some innovations in this direction in his great decorative compositions and his brilliant portraits, painted in a most fascinating manner, show masterly handling. Henry Martin, a decorator and also a historical painter; M. Laurent, a portrait painter; and M. Le Sidaner, a landscape painter, all profited from this cleaning of the French palette. And the school of young artists claimed the name of «Neo-impressioniste.»

Before mentioning the names of the young generation it would be well to note those of the «Traditionalists» who defend — and sometimes with great ability — the academic traditions. They are the pure and Giorgionesque Henner, a painter of nymphs with ivory bodies; the classical Delaunay; the severe Jean Paul Laurens, portrayer of a civilization that has vanished; the melancholic Cazin with his fine fancy; the vigorous Roll; the delicate and nervous Henry Lévy; in fact all the members of the Institute; Benjamin Constant; Bonnat, a pronouncedly pedantic painter, director of the «École des Beaux Arts»; M. Detaille who represents military painting, cold and panoramic, never painting a graceful detail; M. Carolus Duran, an elegant virtuoso; MM. Flameng, Jacques Blanche, and Antonio de la Gandora, a skilful poser of female figures.

All these exhibit in the salons, either in the «Société des Artistes Francais» — in which the most noted names are those of MM. Jules Adler and Hanicotte — or in the «Société Nationale» where MM. Cottet, Lucien Simon, Aman Jean, René Menard and George Desvalliere compete with them.

This digression ended, we must — in order to describe those who fell heir to Impressionism — single out two men who stand apart, whose talent though incomplete is not without great merit; Paul Ganquin, the painter of Polynesian scenery and luxuriant vegetation in decorative pages, and Cèzanne. From them proceed the rising masters of to-morrow who win distinction in the «Salon d'Automne» and the «Independents»: MM. Vuillard, Signac Bennard, Maurice Denis, George D'Espagnat, Dufrenoy and Marquet. All enthusiastic young painters of exuberant vigor, working very hard and taking pleasure in it and who, notwithstanding their exaggerated colorists, do not despair of attaining renown in the true and liberal French school.

The limits of this brief study compel us to name, only, the illustrious draughtsmen, whimsical painters or humorists, engravers, water-colorists and lithographers, who recall Daumier, Constantin Guys, Gustave Doré, Avarni and Toulouse-Lautrée, who bear witness to the originality and fertility of French imagination and humor; they are Bracquemond, Lepère, Chèret, Willette, Odilon, Redon, Forain and Louis Legrand.

What are the leading tendencies, the main currents which govern French pictural art to-day? Impressionism henceforth is to take its place in history. It was always recognized that this was not an isolated manifestation, a contradiction to the traditions of the veritable school, but on the contrary a logical return to such traditions which had been tainted by a degenerate Italianism. As a matter of fact it is academicism and not impressionism which is really international. Impressionism may be defined as a reactionary movement against the Greco-Latin spirit and the scholastic organization of painting such as had been imposed on it after the Second Renaissance, by the School of Fontainebleau, Louis XIV's century, the School of Rome and the consular and imperial style. It is also a no less normal reaction against the dark and bituminous style of the degenerate inheritors of Romanticism. In 1850 the sun, which shone alike for all, did not apparently cast its rays on the students' workshops. The impressionists, however, by diligent travail, *sub jove crudo* were able to rectify this omission. It was Turner's example which determined Claude Monet and Pissarro in 1871 to modify entirely their palette. These two masters, at that time young, were struck with admiration by Turner's landscapes in the National Gallery of London. They perceived on studying his pictures that the white effects of the snow were obtained by polychromes and realized that the proper technic to be established was that of the *division of tone*. They accordingly eliminated the earths and the blacks from their palettes. Impressionism was therefore especially a technical movement, a revolution in the art of preparing and composing the palette, in a word, a method, a means, a tool, thanks to which artists succeeding them were able to make a great development in decorative art. The impressionists knew that color does not exist by itself, that the coloring of objects is merely pure illusion, the creative source of the colors being the solar light which reveals and diversifies the objects according to the hours of the day and the state of the atmosphere. Drawing and color exist together in nature; without light there is neither color nor form. It is by light alone that we conceive that a drawing is the limitation of color and its contour. That is why, basing their theory on this,— justified moreover by the works of Chevreul and Helmoltz,— these innovators decided to employ only the seven primitive tones of the solar spectrum, thus following light itself. In this way they brought about the suppression of the *local tone* with a view to bathing their landscapes in an atmosphere of a continually diversified character. They consequently sounded the death knell of the old academic conception of «ombres noirs» (black shadows), and painted shadows, not darker and thicker, but clearer and transparent in different grades of shadings. Owing to these impressionist measures and to the dissociation of tonality, light became the essential theme of the picture and painting evolved, strictly speaking, toward an optical art. The landscape, so conceived, is a symphony, starting from a luminous theme and developing on the canvas variations of this theme. The adversaries of impressionism objected that the process was easy to employ. In this they were greatly mistaken. On the contrary, the process is exceedingly difficult in unskilled hands resulting in a confused and disjointed whole. To paint in divided tones and keep a just relation of color, avoiding too brilliant reflexes demands an extraordinary surety of eye and hand, an acute sensibility and a perfect chromatic science. Impressionism has rendered immense service to contemporary painting, renovating it, invigorating it and rejuvenating it. It is one of the most beautiful artistic movements in the history of art. It has brought a gust of pure air, a caressing touch to a superior nature. The work of the masters of this school is one of light and a feast for the eye. A landscape by Monet stimulates the imagination; we look at a canvas of Berthe Morisot and for the time we live in a delightful park. The influence of French impressionism on foreign painting was equally felt; in Germany, Max Lieberman, Felix Borchardt, Gothardt Knehl, Karl Koepling, abandoned, in order to follow this new movement the symbolic romanticism of Boeklin and the academic traditions of Stuck; in Norway, Thanlon, Carl Larson, Skredsvig, Dereks; in Denmark, Kroyer; in Belgium, Claus, Verheyden, Theo Van Ryselberghe; in Spain, Anglade, Dario de Regnoyos, Sorolla; in Italy, de Sezantine; in America, Lewis-Brown, who followed de Mault and Degas, and those brilliant virtuosos Morris, Miller, Frieseke. The direct followers of impressionism were the «Pointillistes.» They brought the «broken touch» method to a greater degree of perfection, but instead of combining the «primary» or pure colors on the palette they represented them by dots of unmixed pigment laid side by side on the canvas in order to confer a high pitch of vivacity and an increase of luminosity to their works. The Pointillistes were too often scholars and theorists who made a profound study of the laws of solar analysis. They were criticized in a bantering manner and their work compared to a display of so much confetti; indeed it could be objected, not without reason, that their theories of a cold mathematical precision left no place for that spirit of inspiration and creative imagination sought for in masters. They left nothing to chance, there were no effects at virtuosity, no liberties taken with the palette. It is not surprising therefore that we prefer their aquarelles to their more pretentious works, as they are more spontaneous, more directly appealing and quite often exquisite. Impressionism and Pointillism are really so much *technic* or methods employed to obtain the maximum of luminous saturation on a canvas.

Now a fact quite understood and appreciated by painters is that a painting should not confine itself to an undue influence of light, and paint anything provided «it is clear.» Compose, construct, plan large decorative surfaces, balance beautiful quantities, reduce to a proper sense of proportion, thought and sentiment, even a dream, a poem, a symbol, such was the program the followers of the masters of 1874 to 1880 outlined. In this eminent rôle is one of the most famous painters, so misunderstood to-day — Paul Cézanne. Cézanne felt that after such prodigious labor of analysis it was essential to establish a synthesis and recompose after having dissociated. In the quietude of his little home at Aix-en-Provence, Cézanne worked incessantly; according to him impressionism was only a means toward an end — composition and style were his aim, his ultimate goal. This was what he taught to the younger school and it earned for him the reputation of being a «primitive» artist so different were his pictures to the easy and anecdotic art then prevalent in the salons. Gauguin vulgarized the Cézanian composition and contributed, like his master, to the substitution in the minds of their followers of the sense of the actual for that of the ephemeral. Similarly a curious and refined creator, Gustave Moreau, formed quite an élite of colorists: Desvallières, Piot, Rouault, Flandrin, Evenepoel, Matisse, Lehmann, Marquet, Braut, Guérin, Manguen, Milcendeau, Bussy, in whom he inculcated a taste for culture and a love for the masters of the museum. The influence of the mysterious harmonist Odilon Redon should likewise not be overlooked. Thus, briefly summed up, we have the influences which manifested themselves in France on the colorists who exhibited at the Independent Salon and the Salon d'Automne, while at the official salons the deplorable academic traditions prevailed.

Excesses, incoherences and exaggerations took place; we witnessed the «fauves» who developed to the point of absurdity the theory of their masters. We also saw the celebrated cubists who likewise carried to the extreme the conceptions of Cézanne. The general principles underlying cubism are quite acceptable and even laudable — it is the result which shocks us. The cubist's conception — and it is his right — is to react against ephemeralism, against phenomenalism, against form diluted in the air, against volatilized volumes. Thev desire a return to the constructive school but their error lay in the fact that their constructions were too schematic, based too much on cones and cylindrical cubes. On the other hand tired of the subjects treated on the canvasses displayed in the salons they tried to make of the *subjective* such a rôle as to cause it to be preponderating. The greatest mistake these young artists made consisted — by a quite understandable horror of the literal reproduction of an object — in resolutely turning their back on nature. Now it cannot be too often repeated that an artist can produce nothing of worth without invoking nature. It is not a question of servile copying, of making a «double,» but of interpretation through the prism of sensibility. Once an artist endeavors to alienate himself from nature, from which he derives an inexhaustible source, an infinite repertoire of forms, rhythms, volumes and colors, he risks becoming entangled in the phantasms of the abstract, that is to say of the misshapen and the void. What after all are the real theories of the cubists? Our object, they say, is to paint things not as they appear to the eye but as they are seen in the mind, not as one would like them to be but as one knows them to exist. Now how does one know what an object is? By its reality, by its synthesis of volume, under several angles at a time, by its cubic form. Therefore, in order to render decipherable this synthetic form, necessarily complex, it is incumbent to simplify it, reduce it to its principal elements, and in this way arrive at a geometrical figure which presents the aspect of a sketch by a careful student of the École des Beaux Arts — while pretending it to be a synthesis of a part of creation. The cubists desire that the painting shall not reproduce the flat, superficial and literal reality, shall no longer be a repetition of the monotonous exhibits in the world's galleries, but suggest, by simplifications of simultaneous imbroglios, the voluminous objectivity of beings and things. The extraordinary part of this doctrine is that, promulgated by young enthusiastic artists who preferably employ the language of the philosophers, follow the tenets of mathematicians and juggle with Euclid, Descartes and Bergson, the sum total of their striving results in the production of works comparable to a schoolboy's efforts. Octave Mirbeau once compared them to a manufacturer of modern furniture who in his endeavor to make something really striking in the way of complete ornamentation finished by producing — quite unconsciously — a piece of furniture of a Louis XVI simplicity. The cubist, like a beginner or a schoolboy, draws a tree or a human being in a pentagon, a hexagon, a cube or a square.

Is this laughable? Not particularly. These innovative artists are sincere. That a few «farceurs» (humbugs) are to be found in their ranks no one will dispute, but the majority of the cubists are honest and unshaken in the belief of their principles. There does not exist in the whole history of art another example of such a collective mystification as that innovated by the cubists. They wish to render visible at one and the same time the side one sees and that which is unseen. We can reply to them: «Reveal that which we do not see, express the invisible, the inner and profound reality of beings and objects, is verily the goal to which all artists should aim.» The painter's mission is above all to show us a landscape — not merely a corner of a field or a part of a tree, but by his latent poesy, his very soul, transports us to the country itself. In this respect we have Amiel's famous phrase «le paysage est un état de l'âme» («the landscape is a state of the soul»).

Let us take another characteristic example — the cubist portrait painter will paint that part of the head, for instance, which is not seen — the back part. And we say to him: «Confine yourself to depicting what that head contains, express its emotion, its inner mind. The masters throughout the ages confined their efforts to this all engrossing task, Holbein, Titian, Antonello de Messine, Rembrandt, David, Goya, Ricard, Carrière, to mention only the most famous. If you are so ardently desire to paint the other side of the head why not take a second canvas and give it for title 'the same — back view.'» Therein lies in our opinion the fundamental error of the cubist. The theory of cubism has another serious side. While refusing to enter into a lengthy discussion as to its infantile features it should not be forgotten that the followers of this young school have made their presence felt in all countries to such an extent that an explanation and exposure of their methods are necessary. A further and very serious danger of the conception of the cubist is that, desirous of creating what he is pleased to call the «pure» picture, he presents us with something absolutely unintelligible to anyone but himself. His picture is understandable to himself alone; he paints for self, refuses to express in his picture the sentiment of humanity, only touching on such sentimentality in so far as it accords with his own ideal. The cubist scorns any suggestion to compare his work with nature. This theory, frankly indefensible, is tantamount to suppressing the sensitive mind which alone is the existing link between the painter and the spectator. Now of these two characters, the painter and the spectator, if the former is not imbued with the same thought as the latter, how it is possible for them ever to understand each other? To accept the cubist postulate is to gainsay painting, which must forcibly take the objective as the starting point of all syntheses. To proceed otherwise is to steer headlong for the void by sheer sense of an insane pride. It is extremely foolish to desire to be placed on a self-centred pedestal. One should be content with those usages and languages which the rest of the world understand and employ, merely disposing of them whenever possible in a nobler and more beautiful style. The world, the sun, the tree, the flower, the sky, the mountain, the valley are living things worthy of being addressed and portrayed. To substitute the reality of conception for reality of vision is, as we have already stated, equivalent to saying "No" to nature. It should always be borne in mind that nothing can be constructive or imaginative without the aid of nature. The most daring inventions of The Fable, the centaur, the sphinx, the Chimera are all combined with natural elements. "L'Art," has said Nicolas Poussin, "n'est pas chose differente de la Nature et ne peut sortir de ses limites." "Art does not differ from Nature and cannot go outside of its limitations."

That cubists, by weird and inacceptable deductions should endeavor to constitute themselves the ancestors of Paolo Nicello, Breughel le Vieux, Watteau is nothing more or less than the fanciful dream of a humorist's mind. Cubinism then is a topical demonstration of the danger of theorizing to excess, of losing oneself in the research for the absolute. The duty of a critic is to impress on artists "Never allow a reason alone to prevail over feeling and taste; take a just sense of proportion and balance the faculties. The masters of the museums are famous for the very reason that they knew how to co-ordinate the essential qualities which are necessary to any esthetic creation."

From this forced movement of cubism, with its rigid sense of discipline and "procustial" conceptions, a certain amount of good will nevertheless result. Already some young arts of real talent, André Lhôte, LaFremaye, Laboureur, Tobeen, Marchand, have been converted to its ranks in which they have displayed genius of high order. Every effort bears its fruit and it is certainly not on account of any false step — moreover sincere — that the crescendo and forward march of French pictural art will decline or be impeded.

Sculpture.— From Rude to Rodin, including Carpeaux — the three geniuses who represent the entire French sculpture of the 19th century — much vigorous and delicate talent has been seen. Rude raised the standard of sculpture, which was very low at the beginning of this century. Rude was the unique artistic expression of the Napoleonic spirit, so unfavorable to every kind of art. His hauts-reliefs on the Arc de Triomphe de l'Etoile are immortal. Besides Rude, Barye — a powerful animal sculptor — the classicists David d'Angers, Etex and Pradier are conspicuous under the Second Empire, Carpeaux, the sculptor of the group called 'The Dance,' on the portico of the Opera House and the bas-relief of 'Flora' in the Flora pavilion of the Louvre and of a hundred charming "maquettes," of masterly execution and refined taste, achieved grandeur through grace, style through fancy. A brilliant constellation of sculptors was seen in the Third Republic; Falguière, delicately expressive; Dalou, severe and profound; Paul Dubois, subtle; Mercié and Trijalbert, who although declamatory in style are each gifted; and Fremiet, a pupil and nephew of François Rude. All these names and those of the "Rodinisants" and the original genius Camille Claudel, Emile Bourdelle, Desbois and Maillol, were overshadowed by the formidable genius of Auguste Rodin. Rodin (whose recent death we have to deplore) is the third term of this trilogy relating to Rude and Carpeaux. At first he was discussed, ridiculed and disowned by the Institute because he purposely distorted his models so as to better display the intensity of ambient light; he conceived and executed his principal works which are 'The Age of Brass,' 'The Bourgeois of Calais,' 'Saint Jean Baptiste,' 20 busts and a hundred groups in marble and in bronze, illustrating the sad poems of love, of nervousness and of revery. He overturned all preconceived rules, going for his inspiration as far away as Assyria and Egypt and the Middle Ages; his Victor Hugo and his Balzac are statues which caused in the artistic world a sensation not as yet defined.

Architecture and Decorative Art.— The French Revolution that revived all the institutions of the ancient régime only apparently influenced the teachings of the arts. At first French architecture was under the yoke of the Greeks and the Romans. Deep study of the chief works of antiquity always inspires earnest artists, such as Percier and Fontaine; Vignon, who built the Madeleine, and Brongniart, who built the Bourse.

Duban, Labrouste and Vaudoyer revolutionized architecture. Viollet le Duc is charged with restoring Notre Dame (1837). With Lassus, who restored Sainte Chapelle, he struggled romantically against the "Academie des Beaux Arts." Labrouste was the first to utilize iron, which may be seen in the 'Bibliotheque Sainte Genevieve'; Ballard was a bold innovator, who built the 'Halles Centrales.'

The wonderful inspiration of Charles Garnier, architect of the Opera House, is typical of the period of the Second Empire. Still notwithstanding the modern spirit set forth in the teachings of Viollet le Duc, architecture is not yet emancipated; the ideas of Vignole and of Palladio, who imitated the antique, will disappear but slowly — with M. Mogue de Baudot and Vaudremer. After all the rationalistic modernism of MM. Plumet, Chedanne, Gennoys, Binet, Bonnier, Perret-Frere, Dervaus, Jaussely, Tony and Garnier has erected monuments and dwellings commensurate to our needs and to the ideas and customs of our time. See French Architecture.

The revolution in applied art corresponds to that of architecture. The followers of Riesener, Gouthiers and Jacob will be the "furnishers," such as Gallé of Nancy — a cabinet-maker and glass painter, who most always found his motives in floral naturalism; carvers and goldsmiths with exquisite taste, such as MM. Dampt and Lalique, and lastly the makers of ceramics Carriérs and Chaplet, who rediscovered the art of the wonderful Japanese pottery.

French ornament workers during the last 12 years or so have fortunately increased in number and quality. Such artists as Jallot, Gaillard, Follot, Ruhlmann de Fleure, Lucet, Louis Sue, Gustave Jaulmens, have renovated the interior architecture of French homes and excellently counter-balanced the dangerous influence of Munich decorative art; brilliant ceramic artists, Delaherche, Decoeur, Le Noble, Methy, Dammouse, Roux-Champion; goldsmiths, carvers, ironworkers, Robert, Nocq, Rivaud, Mangeant, Monot, Herzen; divers ornamental masters such as the lace worker Mezzara, the embroiderers Ory-Robin, Desvallières, Marie le Meilleur, have likewise contributed to this renaissance of French applied arts. In addition there is the interesting experiment in tapestry manufacture, the exponents of which, Boileau, Gustave Jaulmes, Ottmann and Deltombe, have contributed to the revival of an ancient French handicraft adapting it to the needs of contemporary taste.

In the foregoing is given a very short summary of the principles of French art. The 19th century was one of such great fecundity that under normal influences art should take its part in all events, in the great struggle and in the great hopes that agitate humanity in the present day. Let us say in conclusion that art can now, less than ever, be said to be separated from life. French art is no longer, and does not wish to be, a thing apart from or aside from life. It is in itself the expression of life, not only in vague generalities, but in the most contingent phenomena.

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18. FRENCH CIVILIZATION. Nationality does not consist in a race, still less in the use of a common language, but in the possession of a corporate tradition. A nation is a body of men distinguished from other bodies around it by the possession of an organic tradition which so molds the habits of life of those subjected to it as to define them clearly from their neighbors.

The territory the larger part of which is now called France, and the ancient name of which was Gallia, has since the beginning of recorded history been inhabited by many million men possessed of and influenced by such a corporate tradition as has given unity to their commonwealth even in its most anarchic or barbaric periods, and which permits us therefore to speak of the French people as of a permanent historical phenomenon in western Europe. Compared with this solid and recognizable truth, guesswork upon complicated racial origins and still vainer guesswork upon the evidence of language are negligible.

The characteristics which the Gauls have developed in this national tradition of theirs and in which in turn their national tradition has imposed upon them and confirmed them in are easily recognized by the modern traveler or by the student of the detailed history of the last 300 years. This tradition comports energy working at a very high potential, a potential so high as sometimes to fuse its communications, and so high as to suggest to those unused to it a necessary absence of volume. It comports in philosophy a combination, somewhat paradoxical in character, by which material and tangible things are chiefly regarded and yet treated by the methods of pure thought. Thus no nation has expressed political theory in terms more general than the French, yet none have had less inclination for metaphysics.

In the political sphere the national tradition of which I speak is essentially military, and in the various forms of its expression has never ceased to be so,— by which is not meant that the French are perpetually under arms, or chiefly concerned with making war, but that their conception of the organization of a state is always a military conception; and that as the art of war changes and develops, now tribal, now municipal, now based on castles and at last national, so has Gaul been a loose hierarchy of tribes, a web of Roman municipalities and garrisons, a tangle of feudal relations, or a highly centralized and bureaucratic body. The whole trend and determination of the French mind in civics may be expressed in the formula «Without authority there is no life.» It is on this account that throughout French history promptitude and power are demanded from government, and that among a people to whom the Oriental ideal of collectivism is highly repugnant, so much is demanded from the state and so many of a citizen's actions are considered only in the light of his relation to the state, as though the duties which he owes to the state were in some way more sacred than the rights which the state should guarantee to himself.

The minor and more superficial characteristics that go with this general picture are a vivacity and often an excellence in oratory, an exact and somewhat excessive precision in daily life, accompanied by an excessive neglect of such details as are considered unimportant, which neglect is repulsive to those who carry a less precise order more generally over the whole of life; a considerable artistic faculty, waning and waxing with various periods, but fairly constant in dramatic art and in architecture; a lack of appetite for individual adventure (a trait in which the Frenchman contrasts very sharply with the Scandinavian and the Islander of the North, whether Irish, Highland, English or Dane); and finally, a curious power of common action often suddenly inflamed and always extreme, in which the Frenchman contrasts not only with the Scandinavian spirit upon the north of him, but also with the various Germanies, the Spaniards and Italians of his frontiers, and indeed with every other European community. It is to this trait that France owes the many popular risings and massacres to be discovered in her history, the extreme rapidity with which a leader is chosen and again rejected, the lack of judgment in foreign affairs which cannot but accompany the confused action of a great number of men, and the startling military successes which that common action often produces. Of these of course the main historic examples are the great eastward march of the Gauls in the 3d century before our Lord, which led them to the sack of Rome and of Delphi, and to a permanent colony in Asia Minor; the march of the Crusades, and the wars of the French Revolution. But beside these enormous swarmings of the French, innumerable minor phases of the same type are to be discovered in the 2,000 years of Gallic history. It is to be noted also that just as the French are unique in expeditions of this kind, so are they unique in the multitude of their civil wars.

The good or evil of these characteristics I do not propose to examine, nor can they I think be determined; for they will vary according to the very various ethical systems which abound in the modern world, and every reader will determine for himself whether he approves or disapproves of the Gallic temper. It is such as I have described it.

It will next be remarked that the French, such as they are, have had since the fall of the Roman Empire a very large and disproportionate influence upon the mind of Europe. This truth is so generally appreciated that it needs no expansion here, but a few examples will make it evident to all. French has been the language of a governing class from the river Tyne to the river Euphrates, and from the Atlas Mountains to the mouths of the Rhine.

Feudalism and the whole structure of mediæval society were Gallic in origin. The Gothic architecture is a Gallic invention, as is the collegiate university. The systems of military fortification in the 12th, in the 16th, the 17th and the latter 19th centuries, are French; the French framed the first code of laws since the fall of Rome — it became at once the basis for every code throughout Europe. The French road is the model of the German and the Italian road, and to-day the weights and measures of European civilization are French; while, to mention a detail of no great importance, the French language becomes, with every year, more and more the medium of international communication and especially the medium in which is expressed the general result of European thought.

This permanent and, as it would seem, undue preponderance of the French mind, is in part no doubt due to the mixture of excessive energy with excessive precision which is the vice, or virtue, of the French. But a very large part, and the more easily ascertainable part of this influence, must be laid to causes of another kind — causes more material and dependent upon the sequence of history outside the frontiers of Gaul, and the geographical position of the quadrilateral which the French inhabit; as also to some extent to the influence of soil and climate.

In order to appreciate these measurable causes of French preponderance, let us examine the boundaries of that quadrilateral, and estimate its physical qualities and its historical position.

The French, as I have said above, inhabit *nearly* all the territory anciently known as Gaul, and the boundary which may be set to the Gallic temper runs as follows:

Taking first a point upon the shores of the Bay of Biscay some 20 miles north of the Spanish frontier, the Atlantic coast is the boundary until the Bay of Quiberon is reached; from that point upon the coast of Brittany the line drawn vaguely north and south to the coasts of the channel, excluding to the east the highly different Armorican type which, if place names and folklore are any guide, has probably lain permanently beyond this boundary since a period prior to the Roman invasion. From the point upon the channel so determined, the boundary proceeds eastward and northward along the coast (including the Channel Islands and their dependencies) to a point about half way between Calais and Dunquerque. Thence it strikes inland, including such places as Tournai, Mons, Charleroi, Namur, Liege, but a few miles east of the latter town and somewhat west of the old castle of Limburg the boundary turns sharply to the south and in a somewhat undulating form, after striking the Belgian frontier at Gouvy, runs a trifle west of that line, passes a mile or two east of Arlon, about half way between that town and the frontier, and so reaches the point where France, Luxemburg and Belgium meet, a point in which artificial and political boundaries curiously correspond with real divisions of men.

The limit of which I am speaking next follows the short Luxemburg boundary, and cuts in a line less defined than most parts of its course from the top corner of Lorraine to within a march or so of the Rhine.

This section is difficult to define, from the fact that the population is not possessed of sharply marked characteristics. Between the Gallic belt of Belgium and the non-Gallic, a boundary as sharp as that made by a river or a wall can be discovered by the most superficial observer. There is more difference between Liege and Maestricht than there is between, let us say, an Irish and an English town. But in Lorraine no such sharp differentiation of architecture, manners and general way of life is to be discovered. Language is no guide here, the habits and aspect of a German-speaking village are the same as those of a French-speaking village, and one can only speak of a gradual transformation from the purely French town of Metz to the purely German belt which extends, as I have said, to within about one day's march of the Rhine. The belt between can only be described as mixed.

An exact boundary begins again in the neighborhood of Saverne, and follows the crest of the Vosges Mountains, the valleys and Alsatian plain to the east of which seem never to have been impressed with the Gallic type of culture; but whether under the dominion of the government at Paris, or autonomous, or under the dominion of the government of Berlin, or of foreign or of native lords and bishops, to have been other than Gallic in temper, and resembling in historic times any one of the minor subdivisions of tribal Germany.

Across the gap of Belfort the line runs just barely including that fortress a few hundred yards to the east of whose town boundaries everything, from the aspect of agriculture to the gait of the peasants, ceases to be French.

The line next proceeds to the peculiar isolated peak known as the Mont Terrible, runs down the middle of the Jura valleys, and from the end of that range of mountains can again with difficulty be determined; the great mass of mountains which lies between the gap of Geneva and the Mediterranean may justly be regarded as less French in character than the Italian valleys upon the farther sides. French influence and culture and the march of French armies have more deeply affected the Val d'Aôste, for instance, than such remote villages of Savoy as Lagrave. But one may say in general that it is safe to exclude Geneva and to include most of the mountain mass lying south of that town until the Mediterranean is reached. The shores of that sea continue the boundary so far as the neighborhood of Perpignan, and though the Catalan language and the Provençal, the highly differentiated climate and the long Roman tradition of this belt make it a thing somewhat apart in France, yet we must recognize the sea as the boundary of Gaul with the exception of a still remaining foreign influence in the town of Marseilles.

In the neighborhood of Perpignan as I have said, and a little before the Pyrenees are reached, the limit which we are defining turns westward and follows the northern base of the hills. So thorough has been the work of French governments since the Revolution, that the valleys running up from that base to the crest of the Pyrenees are, with one exception, now completely transformed in their superficial aspect and seem as French as any other part of the country; but no one well acquainted as is the present writer with the Pyrenean chain can question the identity of the inhabitants upon either slope. Beneath the surface of the modern French system, the manner and cultivation of these valleys is a foreign thing. And the line which we are following may be said, for instance, to include the Canigou and Mont Louis, but not the French Cerdagne; Aix, but not the sources of the Aiège; Bagnieres but nothing beyond it; Tarbes, and perhaps Lourdes but nothing south of Lourdes, and so on all along the chain until, a few miles after the passage of the Adour, the total separate Basque country is reached, where the line strikes northeast and reaches the point upon the Bay of Biscay from which we began to trace it.

It will thus be seen that the political boundaries of France do not exactly correspond to the territory which we are considering, and which as a whole represents the physical basis of the French nation. That territory overflows the political boundaries toward Belgium and Germany, and is within those boundaries in much of its southern and southeastern part as also in the Armorican Peninsula. And this lack of identity between the political and the real boundaries of Gaul has existed throughout recorded history. Thus the Romans took the convenient line of the Rhine upon the east, although the German tribal customs, dialect and general traditions have always existed in a wide belt upon the left bank of that river; and again the nominal suzerainty of the king of Paris (though that is hardly a test) for long excluded Bar-le-Duc, which is as French as Canterbury is English.

When the student sees upon the map of Europe the position occupied by this quadrilateral, he may wonder how that position can be called in any way preponderant. It is apparently but a fraction of the great European area, a fraction thrust far to the west, and occupying no central radiating position. The modern map, uninterpreted by history, and by the known effect of climate, leaves inexplicable the material cause of French preponderance. But an examination of these historical and climatic conditions goes far to explain it, and of the two the historical, which is the more important, should be taken first.

European civilization is not a material spread out evenly from the Ural Mountains to the Atlantic and from the Frozen Sea to the Mediterranean; it is an influence whose general expression is Roman, whose permanent seat is within the old boundaries of the Roman Empire, and which while it has radiated eastward and northward of those boundaries through the influence of the Christian missionaries, loses its intensity as a general rule the further it proceeds from its original seat.

This Roman unity was broken by the Adriatic into two halves, originally widely differing and as the centuries proceeded differing yet more widely. In the eastern half (the Balkan Peninsula, Egypt and the Levant and Asia Minor) old and stable civilizations had accepted the hegemony of Rome. The language of the generality of men was Greek, their interests were those of a very aged and perhaps a somewhat exhausted civilization, whose origins went back to the remotest eras, and whose high art and exquisite literature was already in perfection in epochs long anterior to the furtherest records of history.

In the West, Latin was the general tongue, though for long the educated and wealthier classes were bi-lingual. And there the Roman genius taught and produced a new civilization common to the Iberian, the Gaul and the Briton, to the Kabyle of the Atlas Mountains, and to the German of the Rhine Valley, introducing to all these people a common art, a common tongue and law, and a common happiness. The boundaries of this Latin unity are very clearly determined: A line drawn from Glasgow to Edinburgh including both those cities shows us what part of the British Islands enjoyed this benefit, Wales, the Lowlands and England. The Netherlands, south of the Rhine delta, all the lower left bank of the Rhine and in its upper reaches both banks—all the valley of the upper Danube and the mountains of the Tyrol. All North Africa, from the Bight of Tunis to Tangiers; all Spain and all Gaul—had in common the vine, the mass, the arch, the column, the municipium, the military way, and were one thing.

Now if this boundary be drawn upon the map it will at once be perceived that Gaul was the centre of gravity, so far as mere area was concerned, of the whole system. And to this mere material fact, important though it was, there was soon added a series of historical accidents which very greatly emphasized this central position.

In the same period which saw the flowering of Roman thought into a definitely Catholic civilization, the long transformation of the Roman army was accomplished. It had become an hereditary and a mercenary thing, drawn largely from those populations which did not enjoy the full civilization of Rome and which were therefore ready to accept a wage more easily than would the free citizen of the empire. Through the agency of these armies, in a most confused manner, the barbarian pressed more and more upon the civilized area, and he pressed upon it, though never in large numbers yet always with an energy that varied from an infiltration like that of the Franks or the Burgundians to a savage incursion like that of the pirates who overran the eastern part of Britain.

A little later than the first series of these catastrophes the Mohammedan religion suddenly united the non-Roman desert tribes to the south and these destroyed the civilization of northern Africa which had already been weakened by an anarchy of wandering Germans, revolted slaves and what not, and, finally, by the 8th century the principal islands of the western Mediterranean, nearly all the Iberian and the ports of southern Italy were occupied by the Saracens.

The test of Roman, that is of civilized, continuity, is the authority of the town, with its bishop as the successor (he had once been the coadjutor) of the civil authority. And side by side with this test is a secondary one, namely, the authority of the Palatine Writ: of the Writ issued in Latin from the palace (a word borrowed from the Palatine Hill at Rome) wherein resided the centre of government. Now if we take a map of western Europe as defined within the old Roman limits, and shade with a pencil those Roman municipal areas which lost such a continuity of episcopal government and Palatine, Latin, authority, we shall find that this shading will leave us nothing but northern Italy and Gaul; and indeed, but for the exception which northern Italy presents, the vast area of Gaul may properly be regarded as the only survival of Roman civilization in the West. From this survival, as from an unsubmerged rock in a flood, a platform could be made upon which the damaged conditions of civilization might be rebuilt and from which the influence of civilization could again radiate.

The transformation of Roman society when the recivilization of western Europe began had made it what is called «feudal.» The slaves had become serfs organized in co-operative agricultural communities; the great Roman landlords had become fighting nobles; from this type of society in all its changes, onward until the Revolution, and through the Revolution to our own day, Gaul through every vicissitude has remained the pivot upon which the mind of western Europe has turned. And if at the present moment French armor plating, French road making, the French system of fortification, the French organization of local government, French weights and measures, French field artillery, French submarines, French motor cars, French historians, and the dual polarity of French philosophy, Catholic and anti-Catholic, have imposed themselves upon Europe, this modern accident is but in the general and normal tradition of an historical condition necessary to western Europe.

Apart from these human and therefore most important factors, certain merely material, limiting and therefore inferior factors must be considered. These will be discovered no less than those to conspire in favor of this permanent position of France.

Of material influences in Europe the two most considerable contrasts are the contrast between the northern and the southern type of climate, and the contrast between the tidal ocean and the non-tidal Mediterranean.

A vast number of characteristics may be connected with either of these physical contrasts, and with either portion of each. That materialism which was the dominating note of the last generation and which is but slowly passing regarded climate and such material considerations as we are now discussing as the principal cause of all the differences that could be discovered by the historian. No man would now lend himself to such crudities. The tribal system does indeed roughly contrast with the municipal, in the same way that north does against south, and those who use such terms as «Latin peoples,» etc., conceal beneath their ignorance an appreciation of certain obvious truths which may be roughly connected with climatic conditions. But apart from such speculations, certain very definite material results follow from the pair of contrasts I have mentioned. Thus the rivers of northern Europe are highways; they are usually placid and broad and fairly deep, and are penetrated by the tide far within the plains of that region. Even Scandinavia, which has no such rivers, enjoys the corresponding presence of fjords. The Rhine, the Elbo, the Chelif, the Tiber, the Po, the Adige, are not highways. The Seine, the Rhine, the Thames and the Trent are. Again, the seaport in a tidal sea, to be of value, must be chosen in a more particular locality than in a tideless one. Again, the north gives us longer if not fiercer storms. Again the beach in a heavy tide is less suitable for landing; a heavier type of vessel tends to develop, and with it the possibility of further adventures.

It is evident also that with difference of climate a different architecture, a different agriculture and different social habits will arise; and my point is that the contrast between the two zones in Europe is normally a sharp contrast. Nowhere does one feel it more strongly than in the passage from Switzerland of the German sort over or through the Saint Gothard to Airolo. Between the two points which are but nine or ten miles apart, the whole of life appears to change.

Now Gaul affords the obvious link between these halves of civilization, and, typically enough, Paris, the capital, is in its aspect now a Northern and now a Southern town. It was southern under the Roman occupation, gradually grew northern again during the Dark Ages, and during the Middle Ages was purely Gothic without a vestige of the South about it (except that it was just on the limit of the wine-drinking country). Then again with Renaissance it became again gradually the Southern thing which it is to-day.

Again, on a modern battleship, if it be German or English, you will have only the Northern type of man, accustomed as a rule to the tidal sea, with all the quality of seamanship developed under those conditions, while on an Italian battleship you will have men brought up as boys with the latine sail, the absence of tidal currents, the steeper seas, the sudden gust and the long calms of the Mediterranean. On a French battleship you will have both types of men.

Consider again climate not by meaningless scientific terms of measurement, but as it is expressed in the common experience of life. In the South frost is rare, snow is rare; the long months of cold which render life difficult are not known save in the mountains. The south of Gaul is in this condition. It builds with a flat roof, it knows nothing of skating nor of the preservation of plants through the winter, nor of the isolation which cold elsewhere has produced in the past through long periods of the year. In the North all those conditions are as common a part of life as they are in Holland or in England.

In Northern Europe the sun is the grateful climate; in Southern Europe shade and coolness. In Southern Europe a low relief was sufficient for plastic art; in Northern Europe a high relief. You find them joined in the art of Mediæval France.

Again, consider food. Wheaten bread is the staple of Roman civilization. To the north of it, oats, rye and other poorer cereals; to the east, rice; and, normally, France grows more wheat than any other of the western European states. France grows more wheat than Italy, England and Spain combined. She grows more than half of Europe, outside Russia. Next to wheat the vine has been the staple of French civilization in the matter of food, but the vine is not easily grown northward of a certain limit (though in the Middle Ages that limit extended far into Britain). Gaul, though mainly wine-drinking, includes a northeastern belt which has the custom of Eastern Britain and the German tribes, and drinks beer, while it has a larger northwestern belt which follows the custom of Western Britain and drinks cider.

The northern use of butter, the southern use of olive oil meet in Gaul. The use of and the partial abstinence of flesh — which is largely a matter of climate — depend upon zones which also meet in that territory. Meat cannot be kept in a southern summer; a northern winter cannot healthfully be passed without it.

The list of such contrasts could be drawn out indefinitely by any man of average travel and reading; and in nearly every one of them he would find that French territory was a common ground upon which either type met.

It is in the light of the foregoing general considerations that we must regard the history and character of the French people. They will continue to influence the future as they have influenced the past, and they are the major constants in every far-reaching problem of European importance. But a few closing words upon the immediate conditions of the French will perhaps enable the reader better to appreciate the articles that follow.

In general, those immediate conditions consist in this, that upon the general material of a people welded into their unity by ancient customs, and by a method of thought which they are incapable of abandoning, two considerable discussions are at work. Neither can ultimately affect the profound mass and structure of Gaul, but the victory of one of the two parties in either of these discussions will considerably affect the form or mold into which that mass shall be thrown, and therefore inevitably will affect the general structure of surrounding Europe.

These two discussions are, the discussion upon the purely democratic state, and the discussion upon the authority of the Christian religion.

They are often confused, and nowhere more so than in France itself. But the connection between them is quite accidental, and no accurate conception of the position can be arrived at until each is regarded quite separately from the other.

The modern French experiment in democracy is, in the main, a reversion to the ideal of the old civilization of the Mediterranean. It contains no part of that anarchic ideal of individual liberty common in more rudimentary states: an ideal that inevitably ends in oligarchy and usually in plutocracy. The French experiment in republicanism is an experiment which presupposes a highly organized, a highly centralized and a powerful state, capable of crushing by a common effort all sporadic and particular energies which may be antagonistic to or even separate from the common life. And the experiment is an experiment and not an achieved one, because the machinery for such a state is so difficult to construct. The experiment has never been tried before and it may well fail. Democracies have existed in small city states usually dependent upon slave labor; they have endured indefinitely in small isolated agricultural states; they have never permanently existed in large states under conditions of high civilization. So long as the French experiment endures, so long the conception of democracy at least, and, to some extent, its forms and ideals, will be observed in Western Europe. And it is a matter of intense interest to watch the succeeding phases of the experiment, the moments when it seems nearly approaching success and the moments when the whole conception seems too unworkable for the complexity of the modern world. I repeat, the issue is by no means decided.

The religious question is a more profound and a more vital one. The whole fabric of French life and tradition is so closely interwoven with the Catholic Church that men who put no credence in the divine origin of that Church find their easiest temporal explanation for its existence in the action and nature of the French people. Its high centralization, its military defense throughout a thousand years, its rigid conception of dogma, its deductive philosophy, are Gallic, not Italian.

Wherever this conception of religion exists, its counterpiece and converse is rationalism. Rationalism had completely dominated the thinking part of the nation and the leaders of its action in the 18th century; indeed it is only since the middle of the 19th that the arguments against that position have gathered strength among the more cultivated classes of the country. Coincident with the maximum of this rationalistic wave, the French Revolution quarreled in its first year with the political organization of the clergy; next the Revolution became identified with all the patriotism and all the energies of the people in the course of a long war, and by the time of the Restoration, a great body of French thought and French energy was definitely cut off from and antagonistic to the national religion. The quarrel between the two still endures. The attitude of many a French statesman toward the Catholic Church in France is not one of neutrality, but one of active enmity proceeding from a conviction that the Catholic Church is not only the permanent enemy of human happiness and liberty, but also of the particular state which it is his function to guide. Conversely, more than one cleric, though of French extraction, has learned to regard the liberal institutions of his country as the necessary and permanent enemies of religion. There is no logical connection between the two ideas: there is but a chance historic association, but that association has acquired great strength with the passage of time and with the succession of some five generations of men who have seen the quarrel continually growing, and no perceptible end to it approaching.

Such are the main combatants in this struggle. But two other factors of importance are present, the Jew and the Huguenot. Neither of these bodies are numerous, but they happen each of them to be extremely wealthy, and this wealth with all that it connotes, of education and of power in the press, is thrown into the scale against Catholicism. It is impossible at this moment to say what the end of the struggle will be. It is only certain that if Catholicism is grievously wounded in France, it will have received a blow far more serious than that which it received in the 17th century. And conversely, if upon the whole the influence of the Church should henceforward grow among the French people, it will be difficult for the forces adverse to Catholicism to prevent the continued increase in political power, both of those populations which are ardently and those that are only nominally Catholic, from Ireland to the Desert. See CHURCH AND STATE IN FRANCE (articles 10 and 11).

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19. JOURNALISM IN FRANCE (1631-1918). Without exaggeration it may be said of France that all the "real" in the political, social, economic and artististic life of that country has been reflected in the formidable museum of public prints which opened in the 17th century with the first *Gazette* of Théophraste Renaudot, and which, in the ages to come, will never cease to be enriched with new acquisitions. For the French, indeed, and especially since the Revolution, the newspaper has become not only the mirror of the daily events, but also a fighting weapon, one of Freedom's tools, a political force, a tribune for the orators of all parties, but also a real battlefield in moments of stress, when blows were exchanged and men killed. After having been an instrument wielded by Power, the newspaper in France averred itself the spokesman of all great popular enthusiasms, of all popular explosions, of the wrath of the lowly against the great. It became the clarion of all free ideals, of all generous or mad utopias. It spoke for the multitude with the voice of the multitude. It became a soldier and an insurgent. And like seeds, it cast on its path the coming ideas. It was one of the feverish workmen who threw down the Bastiles. The legislators' decisions were dictated, provoked and compelled by it. Carried away by its enthusiasm, it became a poet with Chénier, a despot with Marat, an idealogue with Babeuf and a dreamer of too magnificent visions with Desmoulins.

An iron hand that wanted to put a stop to it did not even check it on its passionate way. For years, like a subject liable to suspicion, like a dangerous citizen, it was thrown into prison by the rigor of the law. But on an evening in 1814 its prison-gates were shattered. Captivity had not injured its spring. Greater, stronger, firmer, French journalism stepped out of the prison cells of the First Empire. It was to show, in the course of the century, that it had remained the organ and means of all living ideas, the forerunner of progress, the rallying-point of all those who in that country, where spiritual forces are inexhaustible, fight for the Good and the Better, and are willing, in advance, to suffer for this noble cause. The history of French journalism during the 19th century assumes for the historians the aspect of a long and bitter fight. There certainly were papers which flattered the authorities, who followed the taste of the day, and which preferred the art of pleasing with accepted ideas to the talent of fighting for ideas considered subversive. But, on the whole, the part played by the French press was a warrior's part, whether preparing for 1830 or 1848 or trying to fight against 1851 and the Second Empire, or upholding the young Republic of 1871 against the perils which encompassed it on every side. This characteristic of the newspaper in France does credit to it. In this indefatigable stride the best qualities of the French temperament found their true vent. The warmest initiative, the most beautiful aspirations toward human happiness, all the sparkles of wit, all the resources of satire and pamphlet, the finest outbursts of fraternal and humanitarian eloquence, the fiercest addresses against injustice; nay, even the deepest errors of opinion, but the more excusable because of their thorough disinterestedness; all that adorns the French soul with a fine, warm flame, with an endless idealism, with a bright imagination, with a courage sometimes inconsiderate, but always spontaneous; all the splendid virtues and the generous defects of the race, thronged in the columns of the newspaper in one continuous meeting — the voice of a nation that was ever a lover of progress and justice. Indeed, to know the best part of France one has only to glance through several collections of its big and small newspapers; the wise work of time has without more ado separated the tares from the wheat. Whatever excessive passion, violent anger or impracticable dreams may be found therein, they have given way to the luminous outburst of the tenacious will of the French (even and above all in the fever of momentous crises) to remain the apostles and if need be the martyrs, of a free civilization ever on the way to new conquests by the weapons of mind and heart alone.

The newspaper did not exist anywhere in the beginning of the 17th century. Those rudimentary periodicals that were irregularly published in Holland, England and Germany cannot be considered as newspapers. They were for the most part circulated secretly, were chiefly of a licentious nature, and went under the name of "nouvelles à la main" (news to hand). They related mainly the scandalous news of the court or the town, and the writers thereof not infrequently expiated their indiscretions in prison. On 30 May 1631 a Parisian doctor named Théophraste Renaudot (b. London 1586), who was also the founder of pawnbroking establishments, conceived the idea of selling a real newspaper of four pages every Saturday, which he called the *Gazette*, from «Gazetta,» a Venetian coin. This enterprise, which under his care was to last till his death, had its vicissitudes. The novel idea pleased Louis XIII and Cardinal Richelieu, who, almost at once, assisted by Father Joseph, «His gray Eminence,» wanted to make use of it to answer the enemies of the Court. But Renaudot's success aroused jealousies. His receiving a pension of 800 livres provoked irritation. The word «gazeteer» became an insult. The first of all journalists answered the envious in 1632 in his paper. His articles were printed next to those of the king himself, who nevertheless did not sign, and to those of Richelieu. The paper had a great success, and was sold by little newsboys at about six centimes. From 1649 it became necessary to print supplements and extra numbers. The first number bore this device: «On one point alone, shall I yield to no one: the research of truth, which, nevertheless, I will not vouch for, as out of 500 pieces of news, sent post haste from one country to another, many a one from our own correspondents may have to be corrected by Father Time.» Louis XIII, delighted with his own first contributions, continued to write, and besides articles on general politics he related his quarrels with his wife about affairs concerning the welfare of the kingdom. Much later, under Louis XIV, the *Gazette* printed the following avowal: «Every one knows that the late king not only read my *gazettes*, but that he sent me, *almost* daily, matter to be inserted.» Thus, from year to year, until the very last (1792), the newspaper of daring Renaudot (he had died poor and miserable) came to make up a huge collection of 163 quarto volumes. During the lifetime of its «inventor» it had known many competitors who, for the greater part, were satisfied with copying it servilely, word for word. By a strange proscription, several states bordering upon France had forbidden the *Gazette* to pass their frontiers.

From 1651 to 1659 the *Muse Historique* was published. A man named Loret related the week's occurrences in very bad verse; during the eight years he wrote some 400,000 lines. The readers enjoyed these lucubrations, each number of which ended with something like «Written, in April, on the 28th, before my supper was ready-cooked.» The *Journal des Savants* appeared in 1665 and treated of literature and new books. Next appeared the *Mercure Galant* in 1672, published by Donneau de Vizé, which became the *Mercure de France* in 1724. It contained chronicles, letters, feuilletons or serials and dramas, notices of marriages and deaths, stories of intrigues, religious, academical and judicial news, riddles, songs, etc. The *Journal de Trévoux* appeared in 1701 under the direction of the Jesuits and in opposition to the *Journal des Savants*. This newcomer was profoundly religious and bore the brunt of Voltaire's irony. Many new papers sprang up almost at once, the best known being the *Année Littéraire* of Fréron. It was published every 10 days on 72 sheets; it fought the encyclopedists, continuously abused Voltaire, and lasted from 1754 to 1776. Besides the *Pour et le Contre* of the Abbé Prévost and the *Observateur Littéraire* of Marmontel there appeared the *Journal de Genève*, printed in Paris, an entirely political paper; the *Annales politiques et Littéraires*, a great success, in which can be found a foretaste of the virulence that became customary during the Revolution. In 1776 the Anglo-French paper, the *Courrier de l'Europe* (issued twice weekly in London), had its share in awakening the enthusiasm for the American War. It sowed the political passions in the minds and prepared for its own part the great events of 1789. In 1788 were read in addition the *Journal Général* (on science and art), the *Journal de Paris* and the *Correspondance Secrète* (Strassburg).

Then came the Revolution, which gave birth to the freedom of the press. In the *Tableau de Paris* a few years before Mercier had shown «the readers of gazettes, sitting on benches in the Tuileries or at the Palais Royal, at the Arsenal, on the Quai des Augustins, deeply engrossed in their reading, three times a week.» Now there was a very different sight: a thousand daily papers sprang into existence between May 1789 and May 1793. Mirabeau issued the *Etats-Généraux*, and among the most noteworthy followed the *Patriote Français* of Brissot, who wrote as early as 16 March 1789 that «an untrammeled gazette is a sentry ever keeping watch by the people»; the *Révolution de Paris* by Condorcet, the *Point du Jour* of Barrère, the newspapers of Chénier, Fontanes, Tallien, Camille Desmoulins, Marat, Robespierre, Babeuf and the *Logographe* of Dehody: «In the space of a few months,» wrote the historian Louis Blanc, «there was an unheard-of issuing of papers, monthly, weekly and daily, royalist and popular, elegiac or satirical, wary or unbridled, distilling poison or vomiting insults, sowing errors, proclaiming the truth, making an echo to all passions, dropping flashes of lightning on all ideas.» Besides the papers which were sold, there were others distributed gratis. Printed journalism, hurled-out journalism, journalism in bright posters *stuck* on the walls, all vied with each other for an eager public. Some newspapers had very queer titles, such as *The Republican Soap-ball*, the *Patriot-Hen*, *Saint Anthony's Pig*, *Mustard after Dinner*, *Journal of the Other World*, *Hunt for Stinking Beasts*, *The People's Patriotic Breakfast*, *Everybody's Cousin*, etc.

The press enjoyed unlimited freedom from 1789 till 12 Aug. 1792, when the royalist papers were suppressed. Marat, ever fierce, had issued the *Courrier de Provence* and Desmoulins his *Vieux Cordelier*, an antagonist of the rude *Père Duchesne* of Hébert. Young Camille, in seven numbers, drew up a passionate list of accusations against the men of the guillotine, overwhelming them with brands borrowed from Tacitus. Then Marat struck harder, creating the *Ami du Peuple*, in which he clamored successively for 600, 10,000, 20,000 and 270,000 heads. Maximilien Robespierre upheld the *Défenseur de la Constitution* and Babeuf fought in the *Tribun du Peuple*. The very executioners had their organ; it was the *Bulletin du Tribunal Révolutionnaire*, with the following device borrowed from the 'Athalie' of

Racine: «Celui que met un frein à la fureur des flots, sait aussi des méchants arrêter les complots» (He who can bridle the raging waves knows also how to check the plots of the wicked). Meanwhile, public fury rose ever higher. On 10 March 1793 the printing presses of the Girondin papers were smashed by the mob; Robespierre suffered with the Jacobins of the *Montagne*. Long ago they had silenced the *Journal des Halles*, which upheld the kingship in the coarsest «Billingsgate.» On 25 July 1794 Chénier died for his papers on the scaffold, and three days later the head of Robespierre fell. Opposition sheets now sprang into existence; royalist papers revived: *L'Agonie du Jacobin*, *L'Alleluia des Honnêtes Gens* and *La France Sauvée*. The Directoire fought for its life. The law of 23 Germinal Anno IV was a first step toward the great reactions. On 18 Fructidor Anno V a decree suppressed 42 papers; seven more were stopped on 17 Frucditor Anno VII. The press remained fettered for a long period after the downfall of the Directoire.

Bonaparte, when consul, was no more disarmed by the *Antiterroriste* than by the *Journal de Bonaparte et des Hommes Vertueux*. On 18 Brumaire the suppression of all political papers was decided, save that of 13 sheets which should appear under the supervision of the police and be ruled with ever-increasing rigor. Sixty papers died thus at one stroke (27 Nivose Anno VIII). Among the sheets that were spared were *Le Moniteur Universel, Le Journal des Débats, Le Journal de Paris, Le Publiciste, L'Ami des Lois*, which for a few months was suppressed for having mocked the Institute; *La Clé due Cabinet des Souverains, Le Citoyen Français* (which became the *Courrier Français* in 1804); the *Gazette de France*, the *Décade Philosophique* and the *Journal des Defenseurs de la Patrie*. Neither the Constitution of Anno VII nor the organic Senatus Consulte of Anno X made the slightest allusion to the freedom of the press. Bonaparte had said what he as Emperor Napoleon was to repeat: «If I give full scope to the press, I shall not keep the power three months.» The times were approaching when a well-known sentence of Châteaubriand on the «silence of the adjection» was to rouse the ire of the master and to be the prelude to new rigors.

On 18 May 1804 the first consul became emperor. In 1805 he gave the following warning to the Minister of Justice: «Have good articles inserted in the papers. Let the contributors to the *Débats* and the *Publiciste* clearly understand that when I perceive them to be no longer useful I shall suppress them with all the others and shall keep on but one paper.» A censor's office was created. The *Débats* became the *Journal de l'Empire*. The emperor laid hands on the income of the newspapers. In fact, during the empire, the only real paper was the *Moniteur* with its official sheet. Soon nothing could be said but what the Master willed, a circumstance which explained the little help he found in the press when he was a prey to adversity. In 1808 two bills on the organization of the printing presses and the booktrade were laid before the Conseil d'Etat; they were to end in the famous decree of 5 Feb. 1810. Napoleon wanted firstly to create a censor's office entrusted to magistrates who were to prevent the manifestation of any ideas capable of disturbing the peace and good order of the state. He took the following dispositions: limitation of the number of the printers, unceasing watch over the press to be exercised by the police agents and 22 censors, the right of the Director-General to break printing presses, seize reports, make confiscations, impose fines, imprisonments, etc. This state of things existed till the last day of the Empire for the Parisian and Provincial press; the latter, reduced to a single political paper per «département» and severely controlled, threatened in vain. No opposition was possible any longer.

On 6 April 1814, the Senate restored the liberty of the press. Napoleon, overthrown, was trampled under foot. The 23d clause of the Senatus-Consulte proclaimed that «the freedom of the press is full save for the legal repression of such offenses as might result from an abuse of this freedom.» On 5 July 1814 the government of Louis XVIII brought in a bill which was to become the Law of 21 October. The censorship was restored. But Napoleon left Elba. Tardily he gave the papers back their freedom. Eight days before Waterloo he wanted to restrain their excesses. The *Journal du Lys* and the *Journal Universel* (newly issued) compared the beaten man of 18 June to Cain, the brother-killer. Louis XVIII came back to France. The press continued under the system of previous authorization but enjoyed a great tolerance which it misused by dealing blows at random. On 8 August, a Commission of Censors was created and the law was to be very hard on writers. In truth, the royalist press alone was to be allowed to speak. The papers were to be submitted to authorization of the king, who had the right of suspension or of suppression. Tribune and press took to arms. Benjamin Constant, Châteaubriand and Royer Collard pronounced the most splendid speeches. Never had the press such spokesmen. The great members of the press were at that time Lamennais, Barante, Cousin, Guizot, Villemain, Mignet, Thiers, Sacy, Saint-Marc-Girardin, Augustin Thierry. The laws given on 17 and 26 May and on 9 June 1819 seem to be a success won by the liberated press. They were but a slight progress. They allowed every citizen to publish his thought upon his own responsibility. They granted certain rights to the press and the power of self-defense to the state.

The murder of the Duke of Berry in 1820 suddenly renewed the harsh measures. The minister Richelieu had the bills of exception passed. The censorship was revived. In 1821, the poet Béranger was brought before the judges on account of his songs. The law passed in 1822 authorized the Parliament to judge and punish directly all offenses against itself. Châteaubriand wrote a terrible pamphlet against censorship. Many famous writers were condemned. The ministry tried to buy the newspapers. The war of ideas raged for two years. In 1824, the governmental papers had 14,344 subscribers, the opposition papers, 41,330. In 1825 the former had 12,580, the latter 44,000.

A return to the freedom of the press was believed in under Charles X. It was but a slight respite. The government haled before the judges the *Constitutionnel* and the *Courrier Français* which had made attacks on the Jesuits. They were acquitted. The Ministry Villèle, in 1827, brought in a bill of violent repression, ironically called the "Law of Justice and Love." The public anger was aroused and the bill was withdrawn; Paris illuminated; the Ministry fell. A new bill was passed freeing the press from the trammels of the censorship. It was the glorious hour of the pamphleteer Paul-Louis Courrier. "Let people talk," said he; "let them blame, condemn, imprison you, but publish your thoughts. This is not a right but a duty, a strict obligation on whoever has a thought, to publish and proclaim it for the common good, for, if your thought be good, it helps others, and if it be bad, it gets corrected and it still helps others along. But the abuse? Nonsense! Those who have invented this word of abuse are those who really abuse the press by printing what they wish and by deceiving, slandering or preventing the others from answering."

Thenceforward a mortal strife between the press and the power took place. The *Constitutionnel*, the *Courrier Français*, the *Temps* (the first *Temps*), the *National*, the *Figaro* (the first *Figaro*) and the *Globe* struck daily at the Ministry. On the eve of 1830, a protest by Thiers, signed by 44 journalists, the glory of the French press, proclaimed: "In the situation we are placed, obedience ceases to be a duty." The regulations of July 1830 abolished the freedom of the press. The newspapers raised a protest against this "*coup d'etat.*" The police intervened and smashed up the printing presses of two of the papers; riots threatened, and three days later the legitimate monarchy fell. The press now believed itself to be free. The monarchy of July, born of a revolt, achieved in the name of the rights of the press, showed no thankfulness toward the journalists. A new era began. In November 1830, the Draconian Law of 1825 was abolished. For the papers this foreboded freedom. The *Tribune* of Raspail, the *Bon Sens* of Cauchois Lemaire and Louis Blanc, the *Monde* of Lamennais, the *Constituionnel* and the *Globe* saw a hope of better days. However, in three years the victors had no less than 400 trials. The government had guaranteed the faculty of printing all opinions within the bonds of the laws. The censor's scissors had been suppressed. Made eager by its successes, full of confidence in the future, the press multiplied. Within a short lapse of time there were no less than 20 large papers in Paris. The *Constitutionnel*, whose yearly subscription amounted to 80 francs, boasted of 23,000 subscribers, a very large number for the times. All these papers, with more or less reserve or passion, made attacks on authority. It was the fight of the legitimists against the authority of Louis-Philippe. They were also the first manifestations of the young Republican party.

Caricature made its start, helped on by the discovery of lithography (1830–31). The illustrated comic papers, such as the daily *Charivari*, the weekly *Caricature*, mocked the king and his Ministers. The public liked and clamored for the gay drawings of Granville, Daumier, Raffet, Charlet, Descamps, Bellangé and Charles Philippon, who was prosecuted for having represented Louis-Philippe dressed as a mason busy erasing the promises of July 1830. The king's head was often represented in the shape of a pear. The government began to chastise: From July 1830 to October 1832, 281 papers were seized. In 1835, the *Tribune* proudly announced its 114th lawsuit and its 199,000 franc paid in fines. The *Revue des Deux-Mondes* alone, founded in 1829, all the contributors of which were well known, was not shaken by the tempest. Every opportunity was seized to attack the king. Thus, when the United States claimed an indemnity for the American merchantmen confiscated in French ports during the Empire, the papers accused Louis-Philippe of having bought up at a ludicrous price the debts he wanted France to pay. The press was called the fourth power in the state.

The law of September 1835 at length claimed a bond of 48,000 to 100,000 francs ($9,600 to $20,000) from all political papers; every offense against the king was considered a crime; it was forbidden to proclaim one's self a Republican or to express the hope in a change of government. There was also a censorship for the drawings.

But a great journalistic event was about to take place: The *Presse* of Émile Girardin appeared on 1 July 1836 at the low subscription of 40 francs. Girardin had already created the *Voleur* (1828) and the *Mode* (1829) in which Balzac, Eugène Süe and George Sand had published their first articles; the *Journal des Connaissances Utiles* (1831), which had found 232,000 subscribers in the space of a year. The *Presse* was his masterpiece. With "feuilletons" by Alexandre Dumas and Frédéric Soulié, and diversity of matter, his paper was admirably edited. In three months, he had no less than 10,000 subscribers. Two years later he had advertisements for 150,000 francs. His contributors were Balzac, Dumas, Delphine Gay, Gautier, Léon Gozlan, Süe and Victor Hugo; Balzac published therein his 'Paysans,' Dumas his 'Joseph Balsamo' at the rate of 1 franc, 50 centimes per line (30 cents). A gifted journalist, Armand Carrel, stormed against the paper as "the half-penny bazaar." Girardin took up the gauntlet "in the name of popular literature." A duel with pistols followed and Carrel was killed. The *Presse* continued its brilliant career, imitated by a rival, the *Siècle*. In 1848, the *Presse* was suppressed, reappeared two months later, passed from hand to hand and still exists to-day.

Among the "opinion" papers, we find *L'Univers* of Louis and Eugène Veuillot, a Catholic organ founded in 1833 by the Abbé Migne. It aims at freedom for teaching and quarrels with the bishops. Lamennais, in 1830, had founded the *Avenir*, a sign that the believers forgotten since the Revolution had stepped forth again. Lacordaire and Montalembert contributed to it during its 13 months' existence. In it appeared, on 18 Oct. 1830, the sensational article "On the separation of the Church from the State," which invited the Catholics to turn toward the legitimate king and to break with the new rule of the Orleans.

But in 1840 the French "bourgeois" had become a Voltairian, with a taste for anti-religious papers, for the writings of Michelet, Quinet, Cousin and Villemain. The authorities were molested by the smaller and larger papers alike: the *Guêpes* of Alphonse Karr, soon the *Réforme* of Ledru-Rollin (1843) and the *Journal du Peuple* of Godefroy Cavaignac. In 1845 judicial questions began to be discussed in the papers. In the following year the Paris papers had a total of 200,000 subscribers for 24 sheets. An ever-increasing influence resulted: in 1848, the Temporary government was organized by the press. At first it showed moderation and preached "Concord," then claimed new liberties for itself. Within four months 200 papers sprang up. From 1848 to 1851, there appeared 400 new literary papers and 789 political publications, among which were *Cause du Peuple,* by George Sand, and the *Peuple,* by Proudhon. *L'Avant-Garde* offered to its subscribers a retiring pension after 30 years' subscription, the cost of a third-class funeral and 100 francs ($20) to the widow. The *République des Femmes* wanted to free the earth from its tyrants: all the men. Then sprang up the *Journal pour Rire,* with Nadar, Daumier, Grévin, Cham and Gustave Doré; the *Trompette du Père Belle-Rose,* the *Croque-Mort de la Presse,* the *Lunettes du Père Duchesne,* the *Drapeau des Sans-Culottes,* the *Pilon* and the *Tocsin des Travailleurs.* The *Liberté* informs that it had just made "the acquisition of Alexandre Dumas and of new printing-presses." Victor Hugo, on 1 Aug. 1848, published the *Evènement,* and wrote: "We shall give the foremost place to the event of the day, whatever it be, whatever region of the soul it come from. . . . If among these unheard of days, came an ordinary day, which would be the most extraordinary of all; if, against all possibility, the event came one day to be lacking, that day we would unite in one sheet like a dazzling constellation all the glorious names that stud our staff, and on that day our paper should become its own event." To uphold the social movement, Fournier had created the *Phalanstère,* and Victor Considérant the *Démocrate Pacifique.* There were then 90,000 Socialists in Paris; they read the *République Rouge* and the *Salut Social.* Lamartine, more moderate, wrote in his own paper *Le Bien Public.*

The Revolution soon produced a reaction. The "holy rights" of the press lost their sponsors. Emile de Girardin was thrown into prison. General Cavaignac suppressed seven papers and ordere — something new — that henceforth all articles be signed. Rochefort and Paul de Cassagnac prove that they are great controvertists. Ledru-Rollin, in 1849, helped the press to defend its rights. The *coup d'etât* of Louis Napoleon surprised *L' Union* (conservative), the *Opinion Publique* (moderate conservative), in which Barbey d'Aurevilly published his "Prophets of the Past" and to which the staff contributed without any salary, for the sake of proselytism; the *Patrie,* founded in 1841; the *Ordre* (Orleanist); the *Pays* (conservative), adhering to the republic. The printing presses of the most passionate of these papers were seized. The *Débats, Presse* and *Univers* appeared then under control of the censorship and the *Moniteur* became the official organ. The censorship made use of brutality: fines, suspension, prison. It was forbidden to mention the suits brought for press offenses. A newspaper could be suspended by ministerial decision after a first warning. Victor Hugo in his *Napoléon-le-Petit* branded the new laws on the press.

Villemessant's *Figaro* appeared sprightly and charming in 1854. Weekly at first, then appearing daily, its directors were in turn Magnard, Périvier, de Rodays, Calmette and Capus. Napoleon III said of it: "I believe the *Figaro* owes its success to its way of proceeding by short, varied, numerous articles, each offering some new idea." It was the mirror of Parisian life. Every morning it brought a spark of gaiety; it collected all the witty sayings of the Boulevards. In the *Patrie,* which had become a Bonapartist organ, Cucheval-Clarigny published every week excellent articles on English and American politics. The best contributor to the *Débats* was then Prévos-Paradol, who died at Washington, 20 July 1870, as Ambassador of Napoleon III. The *Chronicle* had a great development. It was fashionable to improvise a witty dialogue on the anecdote of the day. Laughter was the order of the day and French wit sparkled on every side. Aurelien Scholl published the *Nain Jaune,* and he was not the worst joker. But there were also serious newspapers, the *Courrier du Dimanche* (republican), the *Opinion Nationale* (1859), the *Temps* (1861), to which contributed at its foundation Louis Blanc, Jules Ferry, Henri Brisson and Charles Floquet. This paper was to have a deep liberal influence over the "bourgeoisie." Jules Vallès published the *Rue.* The *Petit Journal* came out in 1863, with the daily writings of Thimothée Trimm, "which became the vogue, a real fanaticism." In 1868 came out the *Gaulois,* a rival of the *Figaro* and the official organ of the after-war imperialism, nowadays following the legitimists under the guidance of a Jew converted to Catholicism, Mr. Arthur Meyer. Henri Rochefort started his *Lanterne;* the *Eclipse* of Gill; the *Corsaire,* to which Jules Claretie was a contributor, were forerunners of the coming storm. Rochefort had said, "France contains 36 millions of subjects for discontent." The fall of the empire was drawing close. An article of Pascal Grousset in the *Marseillaise* brought on the murder of Victor Noir by Prince Bonaparte. The affair Hohenzollern-Spain burst out and then came the war. "The press is gagged by the Law of Silence," said the *Figaro* on 29 July, after the battle of Wissembourg. In October the press is accused of giving information to the enemy by publishing too many details, and on 23 Dec. 1870, the *Patrie* was suppressed for having published a relation of war operations. On 4 September the Empire fell, and on that day appeared the *Patrie en Danger* of Blanqui, the *Peuple Souverain,* the *Vérité* of Portalis, the *Tribun du Peuple,* the *Vengeur* of Félix Pyat, the *Mot d'Ordre* of Rochefort, the *Cri du Peuple,* and sundry other journals. The *Combat* opened a one-cent subscription to offer a gun of honor to the soldiers who should kill the king of Prussia. As a joke, to keep up the good spirits during the siege of Paris, the *Trac* appeared — the papers of the cowards. All these papers, paper being lacking, appeared in small sheets, often no bigger than note-paper. They were sent into the provinces by balloon. When the Prussians entered the capital the papers stopped appearing of their own accord. The commune began on 18 March 1871 only to create others, amongst them the *Drapeau Rouge*. All those revolutionary sheets were far from being on good terms with one another, disagreeing either on principles, on persons or on the means of action. After those tragic events a regular and less unusual France was reorganized. The *Journal des Débats*, which had once been liberal-royalist, became in 1872 a moderate Republican. This centenary organ was then read by the liberal and cultured public. A huge press-movement set in. In the provinces big papers started and developed; such were the *Phare de la Loire*, the *Gironde*, the *Petite Gironde*, the *Journal de Rouen*, the *Dépêche de Toulouse*, the *Progres de Lyon* and the *Petit Marseillais*. On 2 July 1871 Gambetta founded in Paris the parliamentary group of the «Union Républicaine» and its organ the *République Française*. In the same year also appeared the *XIX° Siècle*. In April 1872 came out the first *Matin*, declaring in an editorial, «Go ahead . . . said the pioneers of the New World. Let this powerful watchword become that of Republican France. . . . Like the Americans, we have but one aim: progress.» Magnier in 1872 created the *Evènement*, reviving the old title Victor Hugo had chosen in 1848. The *Soleil* of Edouard Hervé (Orleanist), shone in 1873; *Petit Parisien* appeared in 1876 under Jules Roche. Two years later Aurélien Scholl started the *Voltaire*, in which Mr. Raymond Poincaré, future President of the republic, wrote the judicial chronicle. In 1880 Georges Clémenceau, Camille Pelletan, Stephen Pichon and Millerand founded *Justice*, and Rochefort published the *Intransigeant*. For a year there had appeared *Gil Blas*, a gay, light and very fast gazette. The Fathers of the Assumption took a hold on the Catholic readers through *Croix* (1880).

At that time the press could boast of its freedom and proclaim its titles on the Boulevards, a right lost during the period of Boulangism, to find later and to lose again. The fever for more and more information grew from year to year. Information was soon to be the very characteristic of the press. The journalists began to adopt the system of titles and subtitles, reforming the material aspect of the papers and employing the «heading» of the American papers. On 29 July 1881 a law on the press, corrected by the law of 2 Aug. 1882, bridled the licentiousness of the drawings and — very justly — reminded a certain number of illustrated papers of the reverence due to morality.

The *Radical* dates from 1881; the *Nation* from 1883; the *Echo de Paris* from 1884. Created by a Jew, Valentin Simon, it became in 1898 the organ of the Ligue de la Patrie Française. During the Great War, an Academician, the president of the Ligue des Patriotes, Maurice Barrès, wrote daily in it and by his patriotic zeal deserved the surname of «littérateur du territoire.» The *Matin* (the second) dates from 1883. It was created to give exact news on foreign affairs. As early as 1886 Paul de Cassagnac fought in his *Autorite* against the republican institutions. In 1887 the *Cocarde*, followed by all monarchist and bonapartist papers, fought the cause of General Boulanger. The *Eclair* shone in 1888. From 1881 to 1890 the provincial press increased considerably. In 1893 it comprised 5,726 papers. The département of the Gironde had 148 to itself, i.e., one paper per 5,242 inhabitants. The département of the Finistère had but one paper per 39.323 inhabitants.

One of the greatest improvements is to be found in the illustrations. Another happy find was the special wire for the papers printed outside the capital. In 1892 there was still in Paris an Imperialist press. The *Patrie* gave up the game and became an afternoon information sheet, together with the *Presse*, the *Intransigeant*, the *Liberté* and later, during the war, with the *Bonnet Rouge* and the *Heure*. The *Journal* started its brilliant career in 1892. Its first number brought an article by a valiant woman-fighter, Mme. Séverine. Epic strife took place with the *Matin*, followed by reconciliations and new quarrels, provoking the mirth of Parisian readers. At the same moment as the *Journal*, and for a very special reason, the *Libre Parole* was created by the rabid antisemit Edouard Drumont. As passionate as the *Libre Parole*, but in a very different order of ideas, was the *Aurore* of E. Vaughan, which appeared in 1897, to prove the innocence of Captain Dreyfus, accused of high treason. In that paper Zola published his celebrated «J'accuse.» Mme. Marguerite Durand, the apostle of the rights of women, started about the same time *La Fronde*, which had but a very short life, although it had a brilliant staff of women writers.

The universal exhibition of 1900 gave birth to numerous papers, mostly illustrated, and which died when the exhibition shut its doors. A collection of them remains as a valuable document of the history of this manifestation of the world's activity. Ever since, quantities of papers — we cannot give the list — have been born and have died. Each of them had its momentary success. Many fell, but many rose on their ruins. The most noteworthy among the latter are *L'Homme Libre* of Mr. Clémenceau, which he baptized *L'Homme Enchaîné* the day the war censors proved too severe for the magnificent articles of the great writer. The *Humanité* was the ringing tribune of the powerful socialist speaker Jean Jaurès, and which, since his murder on 1 Aug. 1914, has been directed by the Deputy Renaudel and upholds the ideal of the French Labor party; the *Guerre Sociale*, whose career is of the strangest, upheld the most advanced ideas by Gustave Hervé, a violent anti-militarist, who therein planted «the flag in the dung» and who now, an illumined convert restored to less excessive feelings, has called his paper *La Victoire*. The *Oeuvre* is inspired and directed by Gustave Théry, a militant journalist and a very bitter and often just censor of the censorship of the administration, of morals and men; *Paris-Midi* is sold at noon to justify its title, and *L'Information*, once a financial paper, is transformed into a great daily, austere and very well informed. *Excelsior* was founded in 1811 by Pierre Laffitte, a great newspaper starter, the creator of *Je sais tout* and *Femina*; *Excelsior* is a daily paper with many pictures. Since 1917 such papers as the *Trait d'Union*, a Franco-Italian paper, the *Journal du Peuple*, a militant socialist, have appeared, and since 1915 *Le Bulletin des Armées de la République* and innumerable soldiers' papers, written and printed at the front. Meantime, the foreign papers enjoyed a great success in Paris, for they gave the enemies' war-bulletins; the *Journal de Genève,* the *Gazette de Lausanne,* the *Suisse* and also the Italian, Spanish and English papers; the London *Daily Mail* (Paris edition); the German paper *Pariser Zeitung* vanished on the first day of the war. The New York *Herald,* true to its traditions of publishing the news both in English and in French, saw an increase of the just sympathies of the numerous readers of its Parisian edition.

The illustrated papers, *Illustration, Monde Illustré,* the great magazines, the older and more recent ones, *Revue des Deux-Mondes, Revue de Paris, Correspondant,* the *Revue* of Mr. Finot, whose writings are often translated in America; the *Revue Hebdomadaire,* and thousands of magazines and papers of the technical press, amongst which the *Auto,* were in 1917 completed by new organs having as object the stimulating of French energy. The *Explorateur,* the *France au Travail,* the *Usine,* etc., aim at the practical preparation for the difficult after-war days. The artistic press was taking a rest; the *Gazette des Beaux Arts* and the *Revue des Arts Décoratifs,* however, were preparing for their reappearance. The *Art de France* was busily organizing numerous lectures, preparing the national revival in what concerned art.

But the vast family of French journalism was not so deeply absorbed by its work as not to think of foresight and fraternity. In 1875 the press for the first time elected a syndicate to which it entrusted its rights. Later, other groups grew active: the «syndicat spécial de la presse républicaine parisienne,» in which after a scission with the conservative press, the latter founded the *Réunion libre des journaux de Paris.* The assocation syndicale professionnelle des journalistes républicains français dates from 1880, the Association des journalistes parisiens from 1890. More associations have sprung up since.

Thus, through the multiplication of all sorts of papers, the words of Alfred de Vigny (d. 1863) were realized in 1918: «The bourgeois of Paris is a king to whom, every morning, a flatterer tells 20 stories. He is not obliged to invite him to lunch; he silences him and allows him to talk when he pleases. This faithful friend pleases him all the more that he is the mirror of his soul and tells him daily his own opinions in choicer terms than he could find himself. Take that friend away, and it will seem as if the world stopped. This friend, this oracle, this very cheap parasite is — his paper!»

In 1917 there were in Paris 3,170 papers classified as follows: financial, 251; medical, 269; political, 168; fashion, 130; 192 literary, political and scientific magazines and 129 sport magazines. The total for the provinces was about 3,973, whereof 685 were republican «progressists» and moderate; 394 radical and socialist-radical; 99 socialist and unified socialist; 2,208 nationalist, antisemit and sundry; and 587 conservative, Catholic and liberal.

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20. **FRENCH INDUSTRIES.** In order to study French industries methodically we shall divide them into four classes: (1) Great industries; (2) small industries; (3) agricultural industries.

GREAT INDUSTRIES.

Textiles.— In the first rank of great industries stand the textile industries, which really include cotton, wool, worsted, flax, hemp and jute, and also a certain number of secondary industries, each one of which consists of two principal branches: spinning and weaving. To avoid mistakes we shall examine them separately.

The cotton industry consists of spinning-mills containing 6,200,000 spindles and 110,000 power looms. Spinning-mills are confined to three centres: Normandy, where they are in the vicinity of Rouen; Nord, where the centres of Lille and Roubaix stand out prominently; and Vosges, including the department of the same name, Meurthe-et-Moselle and the Territoire de Belfort. Weaving, on the other hand, is much more extended and can be divided according to specialties into 15 districts: (1) Amiens, ribbed velvets; (2) Condé sur Noireau, striped cotton; (3) Le Ferté Macé, coutils of various designs; (4) Flers in Orne, stripes and oxfords; (5) Evreux, corsets and bed linen; (6) Mayenne, specially for what is called Laval; (7) le Nord flannels, bedquilts and sateens; (8) Normandy, shirtings and long-cloth; (9)

Paris, napkins and Turkish toweling; (10) Roanne, blue cotton goods; (11) Tarare, muslins and hand embroideries; (12) Thizy, cretonnes and peruviennes; (13) Saint Quentin, mousselines and gauzes for furnishing; (14) Vosges, cotton-cloth and satinet; and (15) Troyes, cotton hosiery.

The wool industry uses 1,600 heckling machines of different styles; 2,000,000 spindles in combing mills; 390,000 spindles in the spinning mills of carding, and 55,000 power-looms. A certain number of these looms are used by turns for cotton and for wool. The wool-carding mills are most important and form a separate industry. They are situated in Roubaix and in Rheims, and the shoddy mills are in Elbeuf and Vienne. The spinning mills are at Roubaix, Fourmies, Rheims, Vienne and Belfort. As for weaving mills they have 15 different centres: (1) Amiens, noted for serges called du Barry; (2) Saint Quentin and Bohain, cashmeres and light novelties; (3) Beauvais, tapestries; (4) Tours, blankets; (5) Elbeuf, cloth; (6) Fourmies, colored and mixed weaves; (7) Lisieux, printcloth; (8) Louviers, novelty goods; (9) Mazamet, curried fustians and military cloth; (10) Paris, double-milled goods and sateens for uniforms; (11) Rheims, merinos; (12) Roubaix and Tourcoing, novelties for dresses; (13) Sedan, cloth for clothing; (14) Vienne, novelties for ready-made suits; (15) Vosges, articles for footwear. The value of imports and exports of woolens were just before the European War: Imports (yarn and cloth): 59,000,000 francs; exports (yarn and cloth), 322,000,000 francs.

The silk industry consists of 13,000 bassines for separating the thread from the cocoons; 35,000 power-looms for weaving, and 35,000 hand-looms. The silk mills are situated in Cévennes and Gard; silk is made both by machine and by hand in Rhône and the neighboring departments, and the principal centre for selling is at Lyons; for ribbons, the chief centre is Saint Etienne; and for galoons, laces for shoes, etc., and braids, Saint Chamond and Izieux. A new industry (artificial silk) was first made in 1889 by Chardonnet, its chief centre being Besançon. The value of imports and exports of silks were just before the European War: Imports (tissues), 49,386,000 francs ($9,877,200); exports (tissues), 385,774,000 francs ($77,154,800).

Flax and hemp, together with jute, contain, in all their factories, 500,000 spindles; and in weaving, 22,000 power-looms and 20,000 hand-looms. The flax mills are chiefly situated in Nord; the manufacture of thread called «sec» (dry) is in many respects like that called «mouillé» (wet). Sewing thread of flax is also made in the same section of the country. As for woven goods, strictly speaking, their manufacture is divided into a certain number of groups, that can be classed as follows: (1) the factories of the Nord, the chief centres of which are Armentières, Lille and Bailleul, where smooth goods, colored or white, are made in every width; Dunkirk, Beauval and Flixecourt manufacture jute goods, and several places in Somme, awnings and damasks; (2) Normandy is celebrated for shirtings, pillow-cases and table covers; (3) Brittany and Anjou for handkerchiefs, canvas, etc.; (4) Vosges for table and bedroom linen; (5) South for coarse cloth. We may add that in all these sections «ramie» silk is manufactered.

It is estimated that the textile industries, properly speaking, employ 851,000 workmen in France, furnishing occupation to 1,093,000 workers on suits and other garments. They also feed as many cotton as silk mills, more than 2,000 tulle looms are working in Caudry, Calais, Saint Pierre and Lyons. This is the official account of the hosiery business in flax and in wool in Somme, Nord and Vosges; in cotton in Roanne and Troyes; and in silk in Hérault, Gard and Hautes-Pyrenées. Hand-made lace forms one of the most artistic industries of Puy, Bailleul, Bayeux, Mirecourt, etc. Besides these there are innumerable embroidery factories in successful operation in Saint Quentin, Angers, Tarare and Nancy, and of passementeries in Lyons, Nimes and Paris.

The following table gives the number of persons employed in the various industries:

NATURE OF INDUSTRY	Persons employed
Cotton (textile)	167,200
Wool (textile)	171,349
Silk (textile)	123,599
Flax, hemp, jute (textile)	47,513
Hosiery (textile)	56,682
Lace, etc. (textile)	156,554
Ribbons (textile)	48,371
Clothing of all kinds	938,905
Linen garments	212,716

Mineral Industries.—After the textiles, the industry which employs the most men in France is the mining of coal. The coal mines are divided geographically into five districts: (1) the coal miles of the North, covering a surface area of about 109,000 hectares (269,337 acres), distributed in the departments of Nord and Bas-de-Calais, in about 40 grants, the chief of which are those of Anzin, Vicoigne, Noeux, Bethune, Lens, Aniche, Marly, etc.; (2) the coal mines of the East, principally near the Moselle, to which are joined the mountainous districts in Savoie where anthracite coal is found; (3) the coal mines of the Oise, which include the basins of Basse-Loire, Vendée, etc.; (4) the coal mines of the centre, the most important after those of the North, which include the basins of Saône et Loire (Autun, Creuzot, Blanzy, Montceaux, Montchain, 875 hectares, 2,161 acres); those of Allier and Auvergue (Ahun, 2,200 hectares, 7,462 acres); Commentry (2,480 hectares, 5,244 acres); those of Loire (Saint Etienne, Saint Chamond, Rive-de-Gier, Firminy), with a surface area of 25,000 hectares (61,775 acres); those of Savoie and Loire, 42,972 hectares (106,182 acres); of Nièvre, 8,000 hectares (19,768 acres); of Allier, 7,367 hectares (18,208 acres); of Corrèze, 5,432 (13,342 acres), etc.; (5) the coal mines of the South, situated in the departments of Lot, Hérault, Gard, which contain several basins, two of which are exceedingly important, that of Aveyron, 12,000 hectares (29,652 acres), and Gard, 26,888 (66,437 acres), (Grand Combe, Bessèges, Alais, etc.).

Besides these, there are in Hérault the small basins of Neffiez, Ronjan, Graissesac, 8,800 hectares (19,768 acres), and Bousquet d' Orb, 15,129 hectares (37,384 acres), and in Tarn, the basin of Carmeaux, 8,800 hectares (21,744 acres). To coal mining there is always attached the secondary industry, the manufacture of coke and agglomerates.

PRINCIPAL RESULTS OF THE MINING INDUSTRY IN FRANCE FROM 1891 TO 1915

YEAR	French consummation. Millions of tons	Production. Millions of tons	Average number of miners. Thousands of miners
1891	36,573	26,025	131.8
1895	38,640	28,020	137.3
1900	48,803	33,404	162.0
1905	48,600	35,928	175.1
1910	56,530	38,350	196.7
1911	59,530	39,229	200.2
1912	60,677	41,145	202.3
1913	....	40,813	from
1914	....	29,786	40.0
1915	....	19,750	to 50.0

As already expained, the coal mines of the North District cover a surface area of 109,000 hectares (269,339 acres); that is to say they are a very important proportion of the whole mining area in France. During the European War that district has been occupied by the enemy; on the other hand the scarcity of labor has been extreme during that same period. Such abnormal situation is sufficient to explain the decrease of output in 1914 and 1915.

The great mineral industries of France are naturally near the coal deposits. The only way they can be divided geographically is under the same divisions as the coal mines. But the chief centres can be especially noticed as follows: in Bessèges (in Gard) where there are iron mines, blast furnaces, foundries, machine-shops, turning-plate factories, smelting works, etc. Commentry-Fourchambault has blast furnaces, forges, foundries, wire-mills; there are machine shops for the manufacture of steel at Montluçon and at several points where these manufactures are exported, extending through Cher, Allier and the Nièvre; at Creusot there is one of the most important metallurgic establishments in the world, Schneider & Co., which is situated in the centre of France. Henrichement is joined to the railway of Bourgogne and Bourbonnais and connected with the Canal du Centre by a private railroad. Decazeville is the most important metallurgic centre in the South; here are made rails, various iron merchandise, cast-iron pipes for conduits, boilers, etc.

Manufactures.— There are factories in Fives-Lilles (Nord) and Givors (Rhône), chiefly making machinery used in the manufacture of silk and plush, steam-engines, locomotives, materials for constructing railroads, pig iron, and heavy metal work, etc. Indre, in the department of the Loire, makes a specialty of marine constructions, torpedoes, large pieces of cast-iron boilers, etc. In Maubeuge (Nord) are the most important metal works and there are others in Longwy (Meurthe-et-Moselle), both near Belgium; and in Montataire, which contains other factories besides the one of that name; then comes Creil, celebrated for its parquet flooring, and the remelting of old iron, extensively used in the manufacture of tin; and then again the factories of Frouard, near Nancy, Bagugson in Meuse, and Outreau (near Boulogne-sur-Mer); Rive-de-Gier is an important centre for foundries, the manufacture of steel, steam-engines, wheels and material for building railroads; Saint Chamond, especially, is celebrated for the rolling of iron and steel; and lastly comes Terrenoire, where the pig iron of Ardèche is made into iron.

The glass industry is brilliantly represented in France. Besides the manufacture of bottles carried on in the glass works of Blanzy, Rive-de-Gier, Givors, Saint-Galmier, Vauxhot, Reims, Epernay, Fourmies, Valenciennes, and some localities in the Jura, mention may be made of the celebrated factories for making plate glass in Aniche (Nord), Chauny and Saint Gobain (Aisne), and those for making cut glass in Baccarat (Meurthe-et-Moselle), where the industry has reached great artistic excellence, in consequence of which a considerable amount is exported.

Mention should also be made of the chemical works for the manufacture of sulphuric acid and soda. These have warranted the erection of large buildings; for instance, the chemical works in the North, the works in Saint Gobain Malétra, etc. At all these places there are mineral deposits. Other industries of a chemical character can be included in this group, like that of coloring matter, the most representative of which are Saint Denis and Rhône; fecula and amidine works, which are all in Nord; white lead, made in Nord and in the vicinity of Paris; tallow candles, chiefly made in the departments of the Seine, Rhône, Hérault, and Bouches-du-Rhône; dyeworks always located near textile factories.

Ceramics are among the great industries of France. The manufacture of porcelain is especially centred in Limoges; square tiles in Maubeuge, faïence in Choisy-le-Roy, Gien, etc. In this group can be classed the manufacture of cements in Boulogne-sur-Mer, and in the outskirts of Grenoble; and the mining of asphaltum principally found in Savoie.

We can also count among the great industries of France the manufacture of machine-made boots and shoes in Blois, Fougères, etc.; writing pens and pencils in Boulogne-sur-Mer; clocks in Besançon; marble-cutting in Cousolre; cutlery in Chatellerault; perfumery in Paris and in Grasse; gloves in Grenoble and its environs; soap in Marseilles and in the North; hats in Tours, Epinal and Paris, etc.; the picture trade in Tours, Epinal and Paris; the most celebrated manufactures of automobiles in the suburbs of Paris, etc. There are a great many tobacco and match factories. Arms are manufactured in Saint Etienne, cannons in Bourges, and tapestries (Gobelins) in Paris.

It must be said that all the information above refers to normal conditions in France before the European War. The great manufacturing and industrial districts of France being situated in the North and the Northeast, a great number of plants have been either destroyed or entirely removed to Germany with all their machinery. No doubt all these factories will be rebuilt. Already in the Vosges and Alpine districts many factories have been created, mostly for the production of munitions, which hereafter will be turned into industrial factories; the Alpine and Vosges districts have been selected on account of the waterfalls, thanks to which electric power may be created without coal which has been so scarce and so expensive in France during the war. It may be added that all the machinery used in these new factories is of the most up-to-date type and comes mainly from the United States of America.

SMALL INDUSTRIES.

The principal small industries for which the French are especially noted, on account of the taste they have shown for this kind of manufacture, are "Articles de Paris" — so called because manufactured in that city or its suburbs. They can be divided into 13 groups: (1) the toy trade-dolls, dressed and undressed, mechanical toys, various games, all kinds of playthings, heads for modistes, cotillon favors, masks, etc. (2) The manufacture of buttons in horn, bone, vegetable-ivory, papier verni, hardwood, etc. (3) Pasteboard articles, such as bonbon boxes, and all decorative pasteboard articles. (4) False hair and hair work, the demand for which has greatly increased owing to the present style of coiffure worn by women. (5) Fans, certain kinds of which are manufactured in the vicinity of Beauvais. (6) Artificial flowers, many of which are exported. (7) The sheath trade, which includes the manufacture of knife boxes, cases for spoon, fork and knife, cases for surgical instruments, pipes, cigars, opera glasses, cases of white manna-ash, and especially jewelry cases. (8) The manufacture of workboxes, which includes certain small articles used by children as playthings; (9) Umbrellas, parasols and horsewhips. (10) Combs in horn, buffalo-horn, real and imitation tortoise shell with hinges, gilt backs carved, inlaid, etc. (11) Feathers, which are chiefly worn on women's hats. (12) Portfolios and morocco leather work, which is an industry distinct from sheath-making. (13) Fancy articles, such as billiard balls, crucifixes and other religious objects, in ivory or in wood, mountings for canes, lunettes, opera glasses, lorgnettes, knife handles, games of dominoes, toilet articles and articles used by smokers, etc.

Let us mention, as essentially French, the industries that owe their existence to fashion, in which Paris reigns supreme, the term "Mode de Paris" being used in many foreign countries to make their productions sell. It is especially the milliner herself who invents, modifies, improves, and, trying the effect on herself, chooses the best and calls it a new mode. In this industry, rattan, wire and whalebone are used for forming and supporting hat frames, and these are made in the ordinary factories. The modistes, strictly speaking, select and arrange the materials, flowers, feathers and laces. The goldsmith trade also takes a high rank in France, especially in Paris, not only on account of the large goldsmith shops that make only large pieces (all silverware used to ornament the table and buffets), but also the small goldsmith's shops that make a specialty of knives and forks for fish, mugs, sauce-pans, knives and various kinds of utensils, and also religious goldsmith work, such as brass and pewter plates. To this industry can be added that of argentry, for which certain Parisian firms have acquired quite a reputation.

DOMESTIC INDUSTRIES.

Although domestic industries are very prominent in France, it is difficult to locate them because in so many places they are annexed to the great industries. For example, in the textile industries a certain number of localities, such as the environs of Lille and the manufacturing town of Cambrai, flax linen has its home; the workmen use all their skill to get suitable thread from their employers, and then, after weighing it, they take it home; so also in Saint Etienne the manufacture of silk ribbon is made in great part in the homes of the workmen, whose looms work by electricity controlled from a central factory from which the power is distributed; the same is the case in the entire lingerie industry, concentrated in Saint Omer and in Vosges, the work being taken home under the direction of forewomen and contractors, as is almost all the lace manufactured in Bailleul, le Puy and other localities; and much of the labor of the 1,000 mousseline de coton factories in Tarare.

The large stores where ready-made clothing is sold have in their employ many men and women who do the work at home. In the small industries, as well as in the large, part of the work can be done in the homes of the workmen. For instance, all varieties of "Articles de Paris" are usually made away from the factories.

Besides these branches of the chief centres there are other industries that may be considered as family industries in the sense that the manufacturer needs only one, two or three workmen at most on each article, like real or imitation jewelry, the manufacture of effervescents, pharmaceutical specialties, many of which are exported; dyeing and scouring, etc., and numerous others.

AGRICULTURAL INDUSTRIES.

The most important of French agricultural industries is the manufacture of wines, for which France has a world-wide reputation. The departments of Gironde, Côte d'Or, Marne, Drôme, Savoie and Loire yield the most noted vintages, as well as the most abundant; but fine grapes are also grown in the departments of Hérault, Gard, Aude, Gers, Pyrénées-Orientales, Charente, etc.

They can, broadly speaking, be divided into three great classes: Bordeaux, Bourgogne and Heaujolais. Especially noteworthy are the Burgundy wines and the matchless champagne. Next in importance after wines come distilled liquors. There are two kinds of brandy, betterave (beet), manufactured only in the North and consumed there, and wine brandy exported all over the world — a sufficient guarantee of its worth. This last can be divided into three varieties: (1) cognac brandies, which are called (after the places where they are made), Fine Champagne, Borderies, Bois ordinaires and Deuxième Bois; (2) Armagnac brandies, which are known by the names of Bas-Armagnac, Ténareze and Haut-Armagnac; (3) Montpellier brandies. The first are made exclusively in the departments of Charente and Charente-Inférieure; the second in Gers, Landes, Lot et Garonne, and the third in Hérault. Besides the above-mentioned kinds, in all these wine districts Marc brandy is made of the residue of the pressed grapes; and in the department of Indre another brand of local brandies, which goes by the name of Calvados, has gained a certain reputation.

Next in importance to brandies is beer. This is not exported, but a greater quantity has been brewed in the last few years. A great many departments in France situated near the

German frontier have brewed beer after the German fashion so successfully that its general consumption has exceeded that of Munich and Vienna.

The manufacture of granulated sugar is one of the great agricultural industries of France. This gives rise to three different industries: (1) the cultivation of beets for the sugar contained in them, with nurseries for the scientific cultivation of seeds, which are exchanged between France and Germany. These extend over the millions of hectares in the North. (2) The manufacture of beet sugar in Nord, Aisne, Somme and many northern departments that have refineries annexed. (3) The refineries of colonial sugar, which is imported and made into sugar in the ports. Before the European War there were 213 sugar works, employing 31,774 men, 1,614 women and 936 children. The yield of sugar (in metric tons [2,204 pounds] of refined sugar) was in 1909–10, 733,902 tons; 1912–13, 877,656 tons; 1914–15, 302,961 tons.

Besides these great manufactures, which form the basis of French agricultural industries, we might mention a great many more that are developing rapidly, as the preparation of chickory in Nord, successfully used with coffee and sometimes as a substitute for coffee; the digging of peat in Somme, used instead of coal; the manufacture of olive oil in all the southern departments; that of wax and honey, which has been greatly extended in the eastern portion of France; butter, which has necessitated the erection of large factories in the district of Avesnes (Nord); the manufacture of biscuits at Marseilles, Nantes, Bordeaux and Suresnes, etc.; chocolate manufacture; glue manufacture, etc.

The manufacture of agricultural machinery is an important industry and, notwithstanding the competition of American machines, the making of heavy implements like threshing machines is carried on on a large scale, especially in Liancourt, Fumay, Vierzon, Dourdan and Algeria.

AGRICULTURAL PRODUCTS IN THE YEARS 1913, 1914, 1915.

Crop	Produce in thousands of metric tons (2,204 lbs.)		
	1913	1914	1915
Wheat	8,692	7,870	6,472
Rye	1,271	1,138	993
Barley	1,044	1,004	786
Oats	5,183	4,665	3,746
Maize	543	....	....
Potatoes	13,586	11,993	9,057
Beetroot (sugar)	5,930	3,751	1,508
Tobacco	26	24	15

In 1915, the harvests for the principal fruits were as follows (in thousands of metric tons): Cider apples, 4,482; table apples, 206,000; table pears, 66; chestnuts, 147; walnuts, 49; olives, 39; peaches, 13; cherries, 39; plums, 26; prunes, 16; strawberries, 9.

The production of the wines (Bordeaux, Bourgogne, Champagne) ranges between 25,000,000 (660,500,000 U. S. gallons) and 78,000,000 hectolitres (2,060,760,000 gallons). The average for the last 10 years was 47,000,000 hectolitres (1,241,740,000 U. S. gallons).

Number of farm animals in 1915: Horses, 2,227,000; mules, 152,000; asses, 332,000; cattle, 12,287,000; sheep and lambs, 13,483,000; pigs, 5,491,000; goats, 469,000.

In reading the statistics for 1915 it should be remembered that the Germans occupied during that year a portion of the French territory, while on the other hand there was a great scarcity of labor.

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21. FRENCH COMMERCIAL AND BANKING SYSTEM. The history of French commerce and industry, like the history of France itself, naturally falls under two heads: the old régime and modern times.

Previous to modern times, the development of French industry was limited by the guild-system on the one hand, and on the other by the numerous obstacles, inherited from feudal times, which lay in the way of exchanges from one province to another. Many of those obstacles were still in existence on the eve of the Revolution. However, a progressive element was to be found, ever since Colbert's days, in the royal manufactures. They did not belong to the king, but were protected against the guilds' monopolies by privileges conferred by the Crown. We may mention among them the tapestry manufactures of the Gobelins and of Beauvais and the porcelain factories of Sèvres. The private factories of Aubusson (tapestry); Rouen, Marseilles, Lunéville (earthenware); Lyons (silk), and the glassworks in the Vosges — where glassworkers were long styled *gentilshommes verriers* — also deserve notice.

Foreign commerce was effected principally through the French ports: Marseilles, where the tradition of commercial navigation is as old as the town itself; Dieppe, the birthplace of the famous Angot, and the harbors of the Atlantic, which sent our ships to the New World; the old French colonies in the West Indies, Louisiana, Canada and the Indian Ocean are witnesses to their activity. The establishment of the *Compagnie des Indes* (1664) shows us the metropolis taking an interest — unfortunately one too weak and too fugitive — in commercial matters. The reader may also be reminded that the commerce between England and France which, if circumstances had been different, might have developed under the treaty of 1786, was at stake throughout the long duel fought by the first consul and the emperor against the English people.

The home commerce was necessarily purely local; the means of communication being strictly limited to the rivers, the few canals and fewer good roads; the towns were compelled to be self-supporting and the country people had to depend both for their food and their clothes on the produce of their labor and on the housewives' industry.

Before the middle of the 19th century the new canal and road systems and the railway and telegraph lines had given an incalculable power to the latent forces of the country, bringing about a complete transformation of industry and commerce. We may here notice that the impulsion thus given to commerce and industry never equaled in France that which made itself felt in England and in America about the same time.

Among the principal characteristics of the commercial revival of the 19th century we must mention the specialization of goods, the indefinite extension of the fields open to manufactures, a considerable increase in the cash balances and clearing-house statistics, an evergrowing demand for capital and its tendency to concentration and association. Henceforth we see, more and more frequently, societies taking the place of individuals, and joint-stock companies substituting themselves to the ordinary copartnerships (those among the latter which have sleeping partners bear the name of *sociétés en commandite*). The co-operation just mentioned was in France as elsewhere of more frequent occurrence among manufacturers than among tradespeople, and there exists in France in the towns and in the villages a large class of small retailers which have the political strength to destroy any great combination that might attempt to drive it out of the market.

As early as the beginning of the modern period, the government had encouraged industry and commerce and given them the institutions they wanted. The *Code de commerce* was issued in 1807. In order to entrust its application to fully competent magistrates the French produced a unique and admirable system of *commercial courts*. The judges of these are returned by an electoral body exclusively composed of those subject to their jurisdiction. The jurisdiction of *Prud'hommes* was organized on the same lines, finally the Chambers of Commerce, to be elected very much in the same way as the courts, were instituted (1803), their functions being to look after the general interests of trade, to advise the public powers when requested and to lay before them the desiderata of the trading classes. Important rights were conferred upon these Chambers of Commerce, including that of raising certain taxes. One of the most useful works undertaken by the Chambers of Commerce has been their contribution to the organization of commercial education in France. So far that education was practically nonexistent; at the present time it is still comparatively little spread. It is only given in special schools where pupils are admitted after completing their general education.

The interference of the government makes itself felt in another way, more prejudicial than favorable to the expansion of trade, namely by the manifold regulations which are constantly claimed by the working class. The government also has to regulate the system of customs which is largely based on the principle of protection, in France as elsewhere favorable to some producers and a source of grave difficulties to others.

It is practically impossible to give a numerical estimate of the amount of business transacted in France. Mr. Maurice Block put it at 1,000 francs ($200) per inhabitant in 1875. It would certainly be more now, even without including the business carried on at the Stock Exchange; to give an example of the latter it was estimated in 1888 by Mr. Neymarck that the stock negotiated on the Paris Exchange alone reached a yearly total of from 30 to 35 billion francs or 6 to 7 billion dollars.

As to importation and exportation, the following statistics will give an idea of the commercial movement in France. We first extract a few figures from the tables drawn under Louis XVI by Arnould, *chef du bureau de la balance du commerce*.

	Exportation from France to Holland
1658	72,000,000 francs
1716	31,000,000 "
1787	46,000,000 "

	Import from England into France	Export from France into England	Total
1686	18,000,000 f.	23,300,000 f.	41,300,000 f.
1716	13,900,000	8,000,000	21,900,000
1787	58,600,000	37,600,000	96,200,000

We may add that the total importation of France in 1787 seems to have reached from 400,000,000 to 500,000,000 francs as against somewhat less than 100,000,000 in 1716, and the total exportation at the same date from 50,000,000 to 500,000,000 francs as against a little over 100,000,000 francs in 1716. The imperial policy considerably reduced our exchanges with foreign countries, especially with England, with the effect that even under the ultra-protectionist government of the Restoration the figures representing our imports and exports hardly equaled those reached during the last years of the old régime.

In the following columns we give the average reached by the *commerce général* and the

	Commerce général		Commerce special	
	Import	Export	Import	Export
1827	667	698	480	521
1837	1,088	1,024	776	713
1847	1,503	1,672	1,077	1,224
1857	2,987	3,293	2,200	2,430
1867	4,262	4,202	3,408	3,307
1877	4,570	4,371	3,670	3,436
1887	4,943	4,238	4,026	3,246
1897	5,137	4,803	4,000	3,676
1907	7,874	7,256	6,222	5,596
1908	7,180	6,620	5,640	5,050
1909	7,856	7,482	6,246	5,718
1910	9,102	8,104	7,173	6,233
1911	9,809	8,012	8,065	6,076
1912	10,293	8,823	8,230	6,712
1913	10,724	9,260	8,508	6,875

Franc = 19 cents in U. S. currency.

In 1909 the imports were valued at $1,152,715,000 and exports, $1,063,746,000; in 1908, imports $1,088,619,000, and exports, $974,785,000.

commerce spécial respectively during ten-years' periods from 1827 to 1907, and the yearly averages from 1907 to 1913. (The *commerce général* includes all imports and exports of any sort, coins excluded; the *commerce spécial* only includes among imports foreign goods meant to be consumed in France and among exports goods wholly or partly manufactured in France and sent to foreign countries. The sums given represent millions of francs).

The revival of the French commerce and industry after the Revolution and in the course of the 19th century was bound to have its effect on the working of the banks which, being the organs of the public credit, are the natural auxiliaries of exchange. The financial system of the state has also been subjected to a complete reorganization; public works of all kinds, military expenses, etc., have brought about a considerable demand for capital; all the financial markets have come to share in the greater operations of credit and an ever closer solidarity has been established between the various financial markets themselves. The function of bankers, formerly mere money-lenders to the sovereigns, has thus evolved, being placed by circumstances on a broader basis. Hence it is true to say that, although some banking firms can proudly trace their origin several centuries back, the constitution of the banking system in France was the work of the 19th century.

The French banks are divided as follows: (1) The two official institutions, viz., the Banque de France and the Crédit Foncier; (2) the so-called «Haute Banque» and some credit societies of an equal standing; (3) the other credit establishments; (4) the discounting banks. We must point out at once that, from a legal and fiscal point of view, the name of *banquiers* is officially given to some financiers whose function is in fact the same as that of stockbrokers, and who are designated in professional slang by the name of *coulissiers* (as though operating behind the scenes, *dans la coulisse*). The latter name was given to them at a time when they could only practice their business by tolerance, being theoretically excluded from the market by the stockbrokers' privilege.

1. The Banque de France was founded in 1799 by the first consul and finally organized by him, as emperor, in 1806. Its constitution was inspired by that of the Bank of England, but not made similar to it; it belongs to the system which, with some variants, now prevails in most European countries, and is entirely different from that of the United States. The Banque de France has, to begin with, an official function, viz., the issue of bank notes, which it owes to a privilege conferred upon it by law as early as 1803 and renewed ever since, the last renewal having taken place on 19 Nov. 1897, when it was stipulated that it would last for 15 or 23 years more and expire on 31 Dec. 1920. A fresh renewal is already under consideration and cannot fail to be voted for an important period, as it is the wish of the majority of business people. The currency of bank-notes is balanced partly in metal and partly in discounted bills. Something of this system can be recognized in the new principles recently introduced in the United States by the Federal Reserve Act. The sum total in gold and silver amounted in July 1914 to about 4,500,000,000 francs ($900,000,000) in gold and between 300,000,000 and 400,000,000 francs ($60,000,000 to $80,000,000) in silver. Since the outbreak of the war, the gold stock has been gradually increased to 5,000,000,000 francs ($1,000,000,000 at the beginning of December 1916), although several consignments of gold have been sent to England and to the United States. The amount in bills discounted is constantly varying under the direct influence of the economic activity of the country; during the last 20 years it has oscillated between 500,000,000 francs ($100,000,000) and 1,500,000,000 francs ($300,000,000). The limit of the currency of bank-notes has been raised a number of times, and amounted before the war to 6,800,000,000 francs ($1,360,000,000). It must be observed that cheques are used on such a limited scale in France that a high number of notes are a necessity of the ordinary course of business and life. Bank-notes were recognized before the war as legal currency. The limit has now been raised (by a «decree» of 15 March 1916) to 18,000,000,000 francs ($3,600,000,000) in accordance with the necessities of the war, the enforced currency of bank-notes being decreed at the same time; the limit had been successively put at 12,000,000,000 francs ($2,400,000,000) 5 Aug. 1914, and 15,000,000,000 francs ($3,000,000,000) 15 May 1915.

The Banque de France has, on the other hand, a commercial function, consisting in the discounting of commercial bills on condition that they bear three signatures, represent a minimum value of five francs and can produce a minimum interest of 0 franc, 10 centimes The rate at which the commercial bills are discounted varies according to the circumstances of the money and financial markets, but the right enjoyed by the Banque de France to reimburse its notes in silver enables it to keep that rate considerably more even than is the case in countries in which gold is the only recognized standard. During many years before the war the discount rate could be maintained practically at 3 per cent. On 29 Jan. 1914, in consequence of the economic crisis, it was raised to 3½ per cent; it was fixed at 4½ per cent on 30 July 1914, at 6 per cent on 1 August, at 5 per cent on 20 Aug. 1914, and has not varied since (January 1917).

The capital of the Banque de France, originally 30,000,000 francs ($6,000,000), has been raised successively to 45,000.000. later on to 90,000,000, and finally to 182,500,000 francs ($36,500,000) 9 June 1857, in 182,500 shares of 1,000 francs each. They are worth to-day about 5,125 francs. The banque is administered by a committee of 15 régents, five of whom are to belong to the commercial or manufacturing class and three are to be taken among the *trésoriers payeurs généraux* (the representatives of the French Exchequer in the various *départments*). It has a governor and two subgovernors appointed by the government. The banque has a total of 445 branches in the country.

Under the conditions which have prevailed during the last 10 years this privilege has been reinforced, the market of the coulissiers keeping the designation of «marché libre» and embracing all the stocks for which admission to the official quotation has not been obtained.

The Crédit Foncier, the governor of which is also appointed by the government, has an organization very similar to that of the Banque de France. Its special function consists in granting first mortgage loans to persons, villages, towns and *départements.* The Crédit Foncier appeals to the public for the funds necessary to its operations by issuing bonds called *obligations foncières* or *communales.* It has a capital of 200,000,000 francs ($40,000,000).

The following statistics will give an idea of the rate at which bills have been discounted at the banque during the last 50 years:

	Maximum rate	Minimum rate	Average rate
	Per cent	*Per cent*	*Per cent*
1854	5	4	4.30
1864	8	4½	6.50
1874	5	4	4.30
1884	3	3	3
1894	2½	2½	2.50
1904	3	3	3
1914	6	3	4.15

2. The firms which compose the *Haute Banque* are often older than the Banque de France itself. We find them at the origin of all great modern enterprises; their heads were the founders of the Banque de France and of the great railway and insurance companies and their successors still have seats in the councils of both. The government of Napoleon I rewarded their efforts at the time by creating among them the *barons de la finance.* Most of them have kept up the tradition and occupy an important place in the management of the financial market. The loans and other greater financial operations which they used to claim as their own are now partly in the hands of the financial societies which differ from the credit establishments in the receiving of money deposits; the discounting of bills is but a secondary part of their functions.

3. The discounting banks are organized on the three-signature principle and work in connection with the Banque de France. The majority of tradesmen use them and they in their turn apply to the banque where they get their bills discounted. They are of varied importance. Their number, which used to be very great in the provinces, tends to decrease owing to the constant development of the credit establishments.

There are of that kind in France, viz., three of the first class, the Crédit Lyonnais, the Comptoir National d'Escompte de Paris and the Société Générale, which have their statutory or head offices in Paris, and the Société Marseillaise, the Société Nancéienne, the Crédit du Nord, the leaders of the financial decentralization, the head offices of which are established in Marseilles, Nancy and Lille respectively. They occupy an intermediate position between the English joint-stock banks and the greater German societies. The credit establishments appeal to the public for funds, which they keep as deposits, they have created among a large part of the population the habit of having their money deposited in banks, and the parallel habit for bankers of relying for their operations upon the public's deposits as much as, if not more than, upon their own capitals. The credit establishments, like the joint-stock banks, use the greater part of their deposits for discounting purposes, they also devote a certain amount of them to investments and even to loans, although their extreme parsimony in granting the latter somewhat justifies the saying that in France «the credit establishments give no credit.» At all events they never subscribe to an issue of commercial or industrial shares except in a very cautious manner and they are no more anxious to make issues of capital themselves than to invest in the ventures of others. It is true that beside the credit establishments are to be mentioned the «banques d'affaires,» the best known of which are the Banque de Paris et des Pays-Bas and the Banque de l'Union parisienne, whose function is the issuing or introducing of shares, bond and debentures.

One result of the outbreak of the European War was the establishment of a moratorium in France as in England and all the countries engaged in the conflict (although the Germans have eluded the name of moratorium). The disappointment and dissatisfaction of many owners of deposits in credit establishments gave rise to the opinion that disaffection would follow. It can hardly be asserted that this was more than a superficial and passing feeling and that the standing of the establishments was seriously injured. It is right to say that, though the moratorium is still in force, the credit establishments, as well as all the banks of deposits, ceased to take advantage of it and resumed the habit of payments in full on 1 Jan. 1915.

To complete the description of the organs of credit in France we have still to mention: (1) the popular and co-operative banks, as yet but little developed; (2) the land and estate banks (*banques foncières*), the operations of which are carried on in connection with those of the Crédit Foncier; (3) the postal transactions; (4) the savings banks, viz., the Caisse d'épargne and the Caisse d'épargne postale, both of which are official institutions; (5) the land credit establishments, recently created, whose action is still uncertain; (6) the *magasins généraux* where goods can be warranted; and last, but not least the colonial banks, which are constituted under special laws and have a half-official existence. The two more important ones are the Banque de l'Algerie and the Banque de l'Indo-Chine.

The French banks are but scantily represented outside of France; there are only a few branches of the credit establishments in England, Belgium, Switzerland, Spain and in Constantinople. Inversely each year previous to the war saw the establishment in Paris of new branches of the foreign banks, a consequence of the abundance of capital which had made France the money-lender to the whole world.

It is impossible to give an estimate of the banking operations carried on in France. By the side of the joint-stock-companies whose statistics are made known to the public, there exists a large number of private firms whose joint capital certainly exceeds that of the said companies and whose balance-sheets, statistics and other results remain unknown. There is, it is true, a clearing-house (*chambre de compensation*) in Paris, but it is only composed of a dozen members (they were 12 including the representative of the Banque de France, until

April 1906, when their number was raised to 13), and the amount of business settled there is far from representing even the totality of operations transacted in Paris alone. We can, however, subjoin the following statistics, while warning the reader that under the conditions of secrecy prevalent in French private banking the returns are given below the full total. They are taken from the tables of the «Chambre de Compensation» from August 1913 to July 1916.

	Francs
August	2,423,490,843.78
September	2,999,790,068.40
October	3,277,729,349.86
November	2,824,160,673.50
December	3,591,772,534.84
January	3,241,348,903.72
February	3,147,938,228.10
March	3,530,566,899.14
April	3,338,716,504.44
May	3,398,238,125.16
June	3,492,674,442.76
July	3,370,915,077.96

The average per day during the same months was given as follows:

	Francs
August	100,978,785.15
September	115,376,541.09
October	121,397,383.32
November	117,673,361.39
December	138,145,097.49
January	124,667,265.52
February	131,164,092.83
March	135,791,034.58
April	133,548,660.17
May	135,929,525.
June	139,706,977.71
July	134,936,603.11

It is to be observed that the figures of the last named month are not normal figures, part of the sums which fell due on 31 July not having been paid.

Of the three great credit establishments of the state we have of course full statistics which we here append:

	Francs
Cash, etc	939,002,402
Loans and reports	668,153,014
Discounted bills	2,465,433,640
Stocks, shares, bonds	88,668,720
Check accounts	1,555,068,738
Creditor accounts	2,676,918,460
Undue bills	72,113,895

to which we may add a few more figures:

	Francs
Capital	700,000,000
Reserve funds	290,580,775
Net profit	39,824,299
Dividend	25,000,000

See FRANCE, BANK OF.

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22. FRENCH RAILWAYS. Historical, 1823–59.— The principles underlying the present system of railways in France will perhaps be made clearer by a brief account of the several phases that have preceded it.

The earliest experiment in railroading on French soil was a line between Andrezieux and Saint Etienne, intended solely for coal and freight and operated by horse traction. The grant for it was made in 1823 by a simple royal ordinance. It was a grant in perpetuity, without subsidy or guarantee. About the same time grants were made on the same conditions for several other small lines.

In 1832 the first locomotive made its appearance. This was on the line from Saint Etienne to Lyons, and thenceforward passenger service was added to freight traffic.

The government, divining the future importance of the new mode of transportation, worked out a general scheme of trunk lines and submitted it to Parliament. The first debate brought out two contrary principles which were destined to clash frequently thereafter. According to the one principle the state ought to construct and operate the railways; the other principle was that of private enterprise. After some fruitless discussions several grants were made, but a financial crisis which followed forced the recipient companies to ask for a revision of their contracts. The state had to assist them, and in 1840 it guaranteed to the Paris-Orleans Company, for 47 years, 4 per cent interest on a maximum capital of 40,000,000 francs. This was the beginning of an arrangement which afterward became general.

The law of 1842 decided on the creation of the trunk lines radiating from Paris to, respectively, Lille and Belgium; Nancy and Strassburg; Lyons and Marseilles; the centre of France, Bourges and Toulouse; Tours, Bordeaux and Bayonne; Nantes; Rouen and Havre; and lastly from Bordeaux to Marseilles by Toulouse, and from Mulhouse to Lyons by Dijon.

The state undertook the acquisition of a part of the lands, the departments being responsible for the remainder. The state built at its own expense the embankments and other artificial works and the substructures of the stations. The companies had to furnish the permanent way and the working stock, which at the expiration of the grant were to be bought by the state at an expert valuation. The work was begun and pushed forward energetically, but in a short time a financial crisis precipitated by speculation endangered the existence of the companies. The Republican government of 1848 proposed repurchase, which was not accepted.

The empire from the first favored an amalgamation of the various companies, the large number of which was a cause of weakness and of inconvenience to the public. By a series of decrees it constituted the great corporations, unifying the conditions of their contracts and extending the duration of their grants to 99 years. In this way were founded the principal French systems, whose grants expire as follows: That of the Northern Company in 1950; of the Orleans in 1956; of the Southern in 1960; of the Eastern in 1954; of the Western in 1956; and of the Paris-Lyons-Mediterranean in 1958.

Feeling their position strengthened, the companies accepted grants for secondary lines, to serve as feeders to the main lines, and from 1852 to 1857 more than 2,000,000,000 francs ($400,000,000) were expended, when a fresh financial crisis supervened.

At the end of 1858 the situation was as follows:

LENGTH OF LINES

In operation	8,700 kilometers	(5,448 miles)
Granted	16,174 kilometers	(10,050 miles)

EXPENDITURE

	Million francs	
By the state and sundry	780	($156,000,000)
By the companies	3,334	($666,800,000)

1859–75.— The situation of the companies having become critical, the government, on 11 June 1859, induced Parliament to ratify agreements between the state and the companies of the following nature:

In order to restore the companies to the situation they had enjoyed before the grants of secondary lines, the system of each was divided into two sections, called the old and the new systems. The capital appropriated to the new system received a guarantee of 4.65 per cent interest for 50 years, beginning with 1865. Working expenses were included in a single account. Beyond a certain sum, representing the dividend guaranteed to the old system and the redemption of its capital, the excess of the net profits had to be expended on the new system, so as to cover partly, at least, the revenue guaranteed by the state, which was advancing the difference. This scheme has been named the "Overfall" (deversoir). The sums advanced by the state for the guarantee were regarded as loans, the companies paying interest on them at 4 per cent.

On the other hand it was specially agreed that after 1872 the companies should share with the state such portion of their revenue as exceeded a certain fixed figure, called the "partition point." This figure was determined so as to allow the old system a higher dividend than at first, and to ensure to the new system, over and above the redemption charges, a revenue of 6 per cent.

If at the expiration of the grant the companies should prove to be debtors to the state, their working plant was to be assigned for the repayment of the sums due. Moreover, the state might redeem the grant at the end of 15 years by paying for the remainder of the time an annuity determined according to the revenue of the preceding seven years. The working plant was to be bought in at an expert valuation.

Such were the chief clauses of these agreements which enabled the companies to place their finances on a firm basis and to add about 700 kilometers yearly to their lines in operation.

At the close 1875, in spite of the loss of 800 kilometers (497 miles) with Alsace-Lorraine the system "of general interest," that is, the man system, showed the following development:

LENGTH OF LINES

In operation	19,744 kilometers
Granted	26,423 kilometers

EXPENDITURE

	Francs
By the state and sundry	1,412 000,000
By the companies	7,991,000,000

To facilitate the economical construction of lines, a law dated 12 July 1865, had authorized the departments and communes to create secondary lines for themselves in their neighborhood. These railways, which were called "lines of local interest," attained, in 1875, to an extension of 1,500 kilometers, representing an expenditure of 41,000,000 francs ($8,200,000).

1875–83.— During the preceding period, alongside of the great companies, a number of minor companies had sprung up, such as that of the Charentes, that of the Vendée, of Dombes, of the North and East, etc.; but their position had become very much embarrassed. Several of these lines — of "general" as well as of "local interest"— were connected with the systems of the great companies. The Company of the Charentes, one of the most important among the minor organizations, showed an annual deficit of from 4,000,000 to 5,000,000 francs ($800,000 to $1,000,000). The government submitted to Parliament for its ratification an agreement whereby the Orleans Company was authorized to buy up the Charentes Company, and other secondary lines, taking over their indebtedness under certain guarantees. At this particular time there was a great deal of ill-will toward the companies in Parliament and the agreement was thrown out, government being invited to introduce a repurchase bill, which was voted in 1878. The state thus acquired the Charentes Company, and several others, which formed the original nucleus of the state system. The cost was 500,000,000 francs, and it was covered by the issue of the 3 per cent redeemable.

Since 1876 government had been preparing a scheme for completing the railway system. Several commissions were at work on it, and in 1879 M. de Freycinet, Minister of Public Works, procured their consent to a scheme which provided for the construction of 8,700 kilometers (5,391 miles) of new lines, and 8,300 kilometers (5,157 miles) of lines granted but not yet operated, or a total of 17,000 kilometers (10,548 miles), within a period of 10 years. The cost per kilometer was estimated at 200,000 francs ($40,000), making a total sum of 3,400,000,000 francs ($680,000,000), or an annual outlay of 340,000,000 francs ($68,000,000) a very reasonable figure compared with the outlay for the companies during the period 1855–65, when it averaged 430,000,000 francs ($86,000,000) a year. The Freycinet scheme, as it has since been called, refers to the whole of these new lines, together with considerable works to be carried out in the ports.

The agreements of 1879 began to be carried out at once, but the operation of the first lines showed a deficit, which, added to the cost of constructing the new lines, considerably increased the burden on the state. It became necessary, therefore, either to proceed more slowly with the work, or else to have recourse to a financial operation to ensure the completion of the proposed lines.

Owing to a financial crisis it did not seem feasible to make a loan. The state accordingly fell back on the credit of the companies, and the government, in spite of lively opposition, succeeded in 1883 in carrying through Parliament a fresh set of agreements which regulate the French railway situation to-day.

The main features of these agreements may be summarized thus: (1) The companies accept the grant of about 1,200 kilometers of new lines. They undertake to supply, in addition to the working stock and plant for these lines, a sum of 25,000 francs per kilometer, the rest of the cost falling on the state. The companies agree to carry out the works according to plans approved by government and to advance the necessary funds which shall be repaid by annuities. (2) In regard to guarantee the previous distinction between the old and the new systems is done away with. There is only one account for working expenses. The net proceeds from this account are assigned by each company to the service of its debt and to the payment of a guaranteed minimum dividend. If there is a deficiency, the state gives its guarantee. If there is a surplus, it is used for the repayment of the advances made by the state as guarantee, and after the extinction of that debt it goes to the shareholders until the dividend touches a figure known as the «reserved» dividend, after which the profits are divided in the proportion of two-thirds for the state and one-third for the company. (3) With a view to reducing the amount of the annuities guaranteeing the interest, the companies are authorized to carry over till a fixed time the deficits on new lines to a special account, called «Account of Partial Operation,» where the deficit is covered each year by an issue of bonds. (4) A settlement was carried out in respect of the «Initial Outlay» account of the old systems, and also of the value of the stocks, on 31 Oct. 1882. However, the companies may still, by obtaining a simple ministerial authorization, execute supplementary works and charge them to Initial Outlay. (5) The companies which had used the guarantee of interest under the agreements of 1850 liquidated their debt by constructing works up to an amount agreed upon. (6) The state reserves the right of repurchase at any time. Lines which have not completed 15 years' existence are to be valued according to the actual expenditure on them, and the same rule holds good for supplementary works. In regard to the other lines, an annuity is to be paid, determined, as under the agreements of 1859, by the net profits of the last seven years, the guarantee of interest being included. (7) Finally, the companies agreed to a considerable reduction of the passenger rates, and further promised to revise and unify the slow freight tariffs.

The brilliant situation of the companies in 1883 had raised the hope that the burden of the guarantee would not weigh too heavily on the budget. But a period of depression followed the prosperous years, and it was necessary, in order to reduce the expenditure, to proceed more slowly with the works. Accordingly the completion of the proposed lines seems deferred to 1908 or 1910. Subsequently the receipts gradually rose, and in the last few years the calls on the state guarantee have been decreasing; some companies have even begun repayment. However, it is to be feared that the fresh outlays imposed on the companies may defer to a still distant date their entire liberation from indebtedness to the state.

State Purchase of the «Ouest» Railway.— After lengthy parliamentary debates the purchase by the state of the railway system of the Compagnie de l'Ouest was decided and authorized by law on 13 July 1908. It was subsequently decided that the system should be operated in the same manner as the existing state railway, but with a special budget. The «Ouest» Railway was officially taken over on 1 Jan. 1909, and the purchase conditions were arranged by a friendly agreement in conformity with the law voted 21 Dec. 1909. Under this agreement, the state pays the old Compagnie de l'Ouest an annual sum equivalent to the dividend guaranteed to the shareholders, plus the amount necessary to meet the coupons of the bonds. The company retains its private property and cedes to the state all its assets in real estate and working plant. Later, the organization of the administration of the two state railways was established under the law of 13 July 1911, with a joint management, but two distinct budgets.

SITUATION OF FRENCH RAILWAYS OF GENERAL INTEREST IN 1912

In operation...........	40,750 kilometers	(25,320 miles)
Concessions...........	43,000 kilometers	(26,719 miles)

Preliminary expenditure	Million francs	
By the State or localities......	8,038	$1,607,600,000
By the companies............	11,682	2,336,400,000
	19,720	$3,944,000,000

Characteristics of the Present System of French Railways.— We have seen that the railway system which has prevailed in France is rather due to circumstances than to the realization of theoretical ideas.

It is a mixed system, which, while respecting the supreme rights of the state and according it a very extensive control over the companies, leaves the latter as much independence and initiative as are necessary for the proper management of their business.

The companies enjoy a monopoly and operate the lines, while the state continues to own them, and only concedes them for a limited period. Entrusted with a public service the rights and duties of the companies depend on contracts made with the state, which exercises over their management a threefold control — financial, technical and commercial, in virtue of the threefold character of the railway system. The exercise of this control comes under the powers of the Minister of Public Works, who is assisted by various commissions, according to the nature of the questions at issue. The most important of these commissions is the Advisory Railway Board, whose functions are chiefly commercial.

Financial System.— The financial system of the companies is regulated by agreements, viz.: Those of 1883, which are actually in force, and of which the details have been given above. The state, having refused to divest itself of its proprietary rights over the railways, and on the other hand having compelled the companies to construct costly lines, has been led not only to undertake a part of the initial outlay but also to guarantee a minimum interest on the capital invested. Consequently, the state must satisfy itself as to the correctness of the companies' accounts in respect of initial outlay and working expenses, since these determine the amount of the guarantee of interest, and also of the annuity to be paid the companies in reimbursement of their advances. The state also controls the financial situation of the companies. It sees that the issues of bonds are sufficiently guaranteed, and that a right proportion is observed between the shares and the bonds. Lastly, the law of 27 Dec. 1890, places the statutes of the companies' pension funds under ministerial control.

Technical System.— The state intervenes also in technical questions. When the companies are constructing new lines, the plans and estimates must be submitted to the minister, who has the draught verified, and sees that all the works are planned in accordance with scientific requirements and satisfy the terms of the accepted estimates. Moreover, he causes the execution of the works to be supervised. When the companies wish to improve existing lines or to increase the working stock, they must likewise submit their plans and estimates to the minister's approval. There is government control also over all regulations touching the working of the lines, over the speed of the trains, the limitation of hours of labor, and various internal matters. The railway police is regulated by the law of 1845 and the ordinance of 1846, modified in 1901.

Commercial System.— Railway tariffs affect public wealth too deeply to have escaped government control. To begin with, in the terms of contract appended to the grants, maximum tariffs were laid down for passenger and freight services; these cannot be exceeded by the companies though they may reduce them as much as they please. However, such reductions cannot come into force till they have been confirmed or approved by the minister, who has the right to withhold confirmation or only to accord it subject to certain modifications. This gives the government a means of exercising pressure on the companies in such direction as it may desire.

An elaborate method enables the minister to get information as to the reasonableness of the proposed change, and constant shifting of rates, which is so harmful to the public, is carefully guarded against. In some cases, e.g., of export tariffs or transit tariffs, the ordinary regulations are modified so as to enable the companies to meet foreign competition.

Tariffs.—The terms of contract fix the maximum amount of the taxes which the railway companies are allowed to collect. That is the legal tariff. But the companies have exercised their right of introducing lower tariffs. When freight is conveyed with all the guarantees and under all the conditions laid down in the terms of contract, the general tariff is enforced. But when the public consents to some modifications of those conditions, then special lower tariffs are applied. The tariffs are based on the rate paid per kilometer or per unit of transportation. This base may be constant, and then the rate is proportionate to the distance traversed, as happens in the passenger service. Or it may vary with the length of the journey, so as to stand, for instance, at 8 centimes for transits below 100 kilometers (62.14 miles); 5 centimes for those below 300 kilometers (186.3 miles), and 4 centimes for those beyond 300 kilometers. Coal and mineral products were treated thus after 1863. It was a drawback of the system, however, that the rates came higher for journeys of just less than 100 kilometers (62.14 miles), than for journeys of just more than 100 kilometers, and this was true also about journeys in the neighborhood of 300 kilometers. To remove this anomaly, it was specified that in no case should the rate in one section exceed the minimum rate in the section following. This rule, however, produced an intermittent scale (barême à paliers), the rate not changing for a number of kilometers.

To get rid of this defect in turn it was decided to adopt the Belgian tariff, so-called because it first came into general use in that country. Here the base varies only when you pass from one section into another. Thus, to return to our previous figures, the first 100 kilometers (62.14 miles) are reckoned on the base of 8 centimes, the next 200 kilometers on the base of 5 centimes, and those beyond on the base of 4 centimes. So that we get a diminishing base. The Belgian system is commonly used in France to-day both for rapid and for slow freight; but such has not always been the case.

At first the tariff had a fixed base, but in order to encourage this and that special traffic the companies introduced for certain freights and between certain stations fixed rates called «steady rates» (prix fermes), lower than those called for by the general tariff. The number of these «steady rates» increased so rapidly, however, that the handling of the tarifts was much complicated. Moreover the principle involved in the «steady rates» was much attacked. Accordingly, after the agreements of 1883 the companies proceeded to recast their tariffs. They were simplified and partly unified; freights were divided into six series; the diminishing base of the Belgian system was adopted; and a slight reduction of rates has been the general result.

However, the «steady rates» have not yet altogether disappeared, for they meet a real need, but their number is much smaller.

Economic and Financial Results of the Agreements.— Under the agreements of 1883 the railways of France have attained to a development which seems not far removed from the limits imposed by the nature of the soil and by existing economic conditions, and beyond which they could not perhaps be profitably worked.

For each thousand inhabitants in France there is 1.26 kilometers (5.78 miles) of railroad, while England has only 0.86 kilometer, Germany 0.94, Belgium 0.97, and the United States 0.41. Thus France has the lead in this respect. In proportion to area France has 9.2 kilometers of road for each square myriameter (=6 miles 1 furlong 28½ poles); England, 11.5; Germany, 10.0; Belgium, 22.7; and the United States, 4.3. Here, even setting Belgium aside, the order is reversed.

It must be remembered that, owing to the very variety of the regions traversed by them, the several lines of the French system show marked differences in the importance of their traffic. To become convinced of this one only has to glance at a map on which the thickness of the lines is proportioned to the gross receipts by kilometer. There one will quickly perceive a number of great arteries standing out clearly. These constitute the nuclei, as it were, of the great companies, and they are connected together by a network of other lines mostly slender, and with meshes which are larger or smaller according to the nature of the districts they cover. If the creation of the lines had been left entirely to the initiative of the companies, it is certain that the principal arteries would long have remained the only routes opened up, while their ramifications would have been constructed but slowly. It was the influence of the agreements which enabled the less productive lines to be opened and operated.

From the financial point of view the most important result of the agreements has been the consolidation of the companies' credit. In some instances it has made it possible for them to borrow at lower rates than the state itself could have done. But as the increase of their capital made their indebtedness more burdensome, and on the other hand the operation of new lines caused a deficit, they were obliged to call on the guarantee of interest for sums which before the conventions of 1883 amounted to 545,000,000 francs ($109,000,000), and between 1883 and 1903 rose to 951,000,000 francs ($190,200,000).

But it must be borne in mind that the amounts paid over as guarantee of interest and which figure in the budget as expenditure constitute in reality an investment for the state at 4 per cent secured by the rolling stock, which is of a much higher value.

Moreover, if during the years subsequent to the agreements of 1883, the annual amounts called for by the companies from the state reached 93,000,000 francs ($18,600,000) in 1893, they fell to 4,000,000 ($800,000) in 1900. The companies began to reimburse more and more, and the accounts for 1910 showed a balance in favor of the treasury of 5,500,000 ($1,100,000). In 1912 it only amounted to 775,000 francs ($155,000), but it must be noted that during that year the Compagnie de l'Est had also refunded to the state under a special agreement 159,000,000 francs ($31,800,000) of the capital amount of its guarantee debt. The debt of the "P. L. M." has been settled since 1897 in conformity with special agreements, and the Compagnie du Nord has never had recourse to a state guarantee.

The accounts of guarantee of interest for the year 1912 for the principal railways are briefly as follows:

COMPANIES	Payments made to the treasury for 1911	Guarantee debt to 31 Dec. 1912	
		Capital	Interest
	*Francs, millions	*Francs, millions	*Francs, millions
Nord	....	....	....
Est	9.6	....	10
Orléans	—9.2	169	94
P. L. M	....	....	....
Midi	0.4	209	121

The sign — indicates a call on the guarantee.
* 1 franc = 19 cents United States currency.

It will be noticed that the Compagnie de l'Ouest does not appear in this table, having been since 1909 under the management of the state, as well as the old line. The latter showed, in 1912, net proceeds of 6,000,000 francs ($1,200,000) while the accounts of the new line show a deficit in the earnings of 96,000,000 francs ($19,200,000).

In addition to the lines of the more important companies, the French railway system comprises a number of small railways which also receive a state guarantee.

On the other hand, the railway companies are a source of revenue to the state by way of taxes on transportation, on their securities, and economy on the transportation of soldiers and sailors, as well as on postal and telegraphic transit; the budget for 1912 therefore shows: expenditure, 361,000,000 francs ($72,200,000); receipts, 358,000,000 francs ($71,600,000). These accounts are thus, so to speak, balanced.

To get an idea of the management of the different companies, it is not sufficient to take into account the amount of their gross receipts, we must compare it with the amount of expenditure, which gives the figure of working coefficient, i.e., the ratio of expenditure as compared with the receipts. We now see that this coefficient, which, in 1880, was 50 per cent, has gradually increased, reaching 60.3 per cent in 1912. This figure, although lower than that of the majority of foreign companies, nevertheless goes to show that for various reasons the operation of railways has become more and more onerous, whereas the transportation tariff both for passengers and goods has decreased since 1880 by about 30 per cent.

On the other hand, during the last few years, the railway companies have considerably increased their initial capital, with the especial object of making the improvements which the heavy traffic had rendered necessary and to increase the efficiency of the rolling-stock; the result, however, has been to greatly increase their financial obligations, entailing a corresponding reduction in the remuneration of the capital invested, which was only 3.72 per cent in 1912.

This is certainly a point to be considered, as in view of the limited duration of the concessions, the period of amortization of the new bonds necessarily becomes shorter.

Military Organization of Railways.*—The regulations governing the military organization of railways were laid down and determined by the laws of 1873, 1877, 1888 and by various decrees.

By virtue of these laws, a special department was organized at the War Office to examine the operation of railways in times of peace and to take over such operation in war time. This department is called the "4ème Bureau" and is in charge of a lieutenant-colonel, who, in turn, acts under the orders of the Chief of the Staff-office.

The management of each railway system comprises a commission called "Commission de Réseau" (Railway Commission), composed of two members, a technical adviser (generally the manager of the line) and a military officer (a superior staff officer). This commission takes charge of the management of the line and acts as intermediary between the military authorities and the railway under its management. It is assisted in its work by sub-commissions, which likewise comprise a military officer and a technical adviser, and by the station commissions consisting of an officer and a technical agent.

The staff of the companies subject to military obligations is mobilized and go to form sections of field railways, officered by their proper chiefs. Each section constitutes an independent unit, comprising three departments: permanent way, traction and operation.

Moreover, each section comprises an active section to be placed at the disposal of the commander-in-chief of the armies, and home subdivisions to be at the order of the War Office.

On the first day of mobilization, the military authorities take over the management of the railways: the lines are controlled by the railway commissions and the employees are militarized in their respective duties. The territory is divided into two zones: (1) the interior zone which is under the control of the War Office, and (2) the army zone under the authority of the commander-in-chief.

Mobilization; Commencement of Hostilities.— As soon as the order for mobilization is given, the ordinary train service is suspended and mobilization trains are run, the timetable for which is drawn up before hand.

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* Consult *Le Journaldes Transports*, *La Revue Politique et Parlementaire*, Octobre 1915.

On the declaration of war in 1914, the transporting of the troops which had been mobilized commenced in the night of 1–2 August, after midnight. The covering troops had already been concentrated near the frontier. This concentration, which was commenced on 31 July at 9 o'clock in the evening, was completed at noon on 2 August. The transporting of these forces on the «Est» railway system required 600 trains.

The order of mobilization required each mobilized man to be transported to his regiment centre and, afterward, the concentration of the regiments so formed into army corps near the front. Now, the transporting of an army corps requires over 100 trains, without taking into account some 30 trains of equipment, etc. The trains comprise an average of 50 wagons.

The transporting of the mobilized forces was completed on 19 August — it had taken 18 days. The «Est» line alone ran more than 4,000 troop trains during these 18 days, and the traffic at certain moments was exceptionally heavy. On three particular days nearly 1,200 military trains were run on the «Est» line, 3,000 on the Paris-Lyon-Méditerranée, and 1,500 on the Paris-Orléans. Three hundred trains were dispatched from some stations in a day. It is worthy of remark that, even during the heaviest days of the traffic, the transporting of the forces was effected with the greatest punctuality and that what delays occurred were insignificant.

The railways had, however, to cope with many other difficulties. The requirements for the concentration of troops were much greater than had been anticipated. About the middle of August, over 400 trains were required for transporting the English army from the Channel ports and the ocean on their way to Belgium, and, later on, 400 trains transported in three days the Indian troops from the south of France to Orléans.

The German attack on France having been directed by way of Belgium necessitated a modification of the original plan of concentration so that it extended from Longwy right up to Fourmies.

Meanwhile, the railways not only had to transport the food and munitions required for the army, but also that necessary for the entrenched camp of Paris. Hundreds of thousands of head of cattle and as many tons of provisions passed over the rails during the month of August.

This traffic formed so to speak a series of uninterrupted streams throughout the whole of France, flowing toward the north and northeast.

After the battle of Charleroi, it became necessary to look after the evacuation of the population of these regions fleeing before the invaders and also remove the Belgian and other locomotives and railway material in the north and east of France, whilst at the same time numerous trains followed the retreating armies, taking to the rear supplies, food, munitions and a part of the artillery, to be centralized at points fixed by the commander-in-chief where the armies were to be reformed prior to the battle of the Marne.

In the meantime, the government and the most important state administrations were hurriedly transported to Bordeaux. Objects of value from the museums were sent to the provinces, and as the enemy advanced toward Paris, thousands of Parisians, women and children mostly, quitted the capital. It has been estimated that some 50,000 people left Paris 3 September by the Orléans station alone.

During the battle of the Marne, an entire army corps was transported in less than a week by 180 trains from the borders of the Meuse to the east of Paris, thus reinforcing our left wing just at the moment when it was commencing to shake the German army.

Finally, after the battle of the Marne, when the enemy was being pursued and was attempting to outflank us to the north, over 6,000 trains were employed to transport 70 divisions, in many cases for long distances, and again the rapidity of transportation was a factor of success.

During these first weeks of the war, the railway personnel not only showed their absolute devotion to duty, but gave striking evidences of their endurance and energy, winning the highest praise alike of the government and the public.

Resumption of Commercial Traffic.— At the commencement of mobilization, all commercial traffic was interrupted; it was resumed by degrees when the concentration of the forces was completed; at first the trains were few and far between, but their number was gradually increased as military transportation permitted. When the war of movements gave place to a war of positions, and a fixed front was established, the consequent decrease in the displacement of troops left more facilities for commercial traffic, and with the resumption of business and the development of war industries, an increasing traffic was re-established.

But as France was deprived of a part of its rich agricultural and industrial provinces in the north and east, it lost the greater portion of its iron and steel production, its coal output and sugar produce, and also the centre of its woolen industry, to mention only the principal industries affected. On the other hand, the requirements of the army attained unprecedented proportions. It became necessary not only to seek raw material abroad but also manufactured goods.

Gradually the movement of shipping considerably increased; the monthly tonnage which, before the war, amounted to 2,800,000 tons, reached 5,019,000 tons in July 1916, or almost double. The increase made itself felt particularly toward the end of 1916; it was more marked for the northern and Channel ports, due to the presence of the British army in the north of France, and to the important centres of Havre and Rouen which supply Paris, but it was general throughout France.

This resulted in a so-called «Transport-crisis.» In a speech in the Chambre des Députés in reply to certain criticisms addressed to railway managers, Colonel Gassouin gave the following figures: A comparison of the present kilometric traffic with that of times of peace gives 140 per cent for the «Etat» lines, as against the pre-war figure, 149 per cent for the «P. L. M.,» 166 per cent for the «P. O.,» and 200 per cent for the «Nord,» and this notwithstanding that there were fewer cars in use than in peace time.

Consequences of the War.— It may seem premature to endeavor as yet to outline the effects of the war on railway companies. Still, if we take into account its results up to date, we shall not go far wrong in saying that there will be an increase in traffic rates in France after the war. This is the opinion of a number of competent men and is backed up by the financial results of operation during the last year or two.

Already in 1913, the railway systems taken as a whole showed an excess of expenditure over and above the earnings of over 42,000,000 francs, resulting especially from the operation of the «Etat,» «P. O.» and «Midi» railways. But owing to the war, the earnings fell suddenly from 2,017,000,000 francs ($403,400,000) in 1913 to 1,670,000,000 ($334,000,000) in 1916 (according to the estimates made), but the total liabilities of the railways passed from 2,059,000,000 francs ($411,800,000) in 1913 to 2,015,000,000 ($403,000,000) in 1914, 2,019,000,000 ($403,800,000) in 1915 and 2,444,000,000 in 1916 ($488,800,000) (estimated figures). It therefore follows that the deficit in the earnings of 42,000,000 ($8,400,000) in 1913, has risen successively to 343,000,000 ($68,600,000) in 1914, to 372,000,000 ($74,400,000) in 1915 and to 455,000,000 ($91,000,000) in 1916. Consequently, it is evident that, notwithstanding the resumption of traffic and a constant growth in the receipts, the deficit continues to increase. This is undoubtedly due to the continual increase in the price of raw material, especially coal, as well as to an increase in expenditure in respect of staff. We have no reason to expect that, after the war, the cost of living, any more than that of raw material, will decrease sufficiently to re-establish the equilibrium which was already broken. An increase in tariffs will alone straighten out a financial situation, a prolongation of which would be prejudicial to the essential interests of the country. Moreover, several countries have already some years back been obliged to resort to this measure rendered necessary by economic conditions, and from which there is no escape in France either.

It is also to be expected that as a result of the war, the opposition in England to the Channel tunnel scheme will disappear. It is not too much to hope that the union of the two countries, after having been cemented on the fields of battle, will continue after the war and will manifest itself particularly by an economical entente and closer commercial contact, which the construction of the tunnel would greatly facilitate. We can already get some idea of the services it would have rendered during the recent war in transporting troops and munitions: the running capacity of the tunnel being estimated at 120 trains a day of 500 tons, i.e., 6 trains an hour, during 20 hours, it would thus have been possible to ensure the safe transportation of 30,000 men and 30,000 tons of goods a day. The great conflict has sufficed to convert several British military authorities to the idea of the tunnel, and all the big shipowners by the mouth of their principal periodical, *The Shipping World,* now acknowledge the utility of the tunnel. Work on a tunnel had been started both from the French and English coasts in 1875 after an English corporation known as The Channel Tunnel Company obtained an act authorizing it to undertake preliminary works, and The French Submarine Railway Company in the same year had obtained a concession obligating it to expend at least 2,000,000 francs ($400,000) in investigation work. The French company made over 7,000 soundings, took over 3,000 samples from the sea-bottom in the Strait of Dover, sank a shaft and started a heading from Sangatte. The English company met with considerable opposition and interruptions and several rival projects were mooted. In 1882 when the British government suspended the work then in progress, a shaft 164 feet deep in the chalk at Shakespeare's Cliff, Dover, had been sunk, whence at an inclination of 1 in 72 a driftway seven feet in diameter projected 2,300 yards eastward under the sea. British officials deemed it «inexpedient for a submarine communication to exist between England and France,» and despite the persistent efforts of a prominent supporter, Sir Edward Watkins, who presented bill after bill, all appeals to be allowed to continue the work were futile. As soon, however, as the British Parliament decides in favor of the tunnel, the work can be speedily pushed to a successful conclusion.

Statistics.— The development of the lines and the paid-up capital by decades and in 1912 was as follows:

YEARS	Length of the lines in operation up to 31 December	Corresponding capital of initial outlay
	In kilometers	*In million francs*
1830	38	6½
1840	435	146
1850	3,010	1,363
1860	9,439	4,726
1870	17,440	8,168
1880	23,738	11,065
1890	33,550	14,271
1900	38,122	16,442
1910	40,300	18,874
1912	40,707	19,720

Kilometer = 0.621 miles. Franc = 19 cents in United States currency.

The division among the several companies in 1912 was as follows:

COMPANY	Average length in operation during the year	Capital enlisted		Shares and bonds issued by the companies	
		Expended by the companies	Subsidies		
	Kilometers	Millions (francs)	Millions (francs)	Shares	Bonds
Nord	3,785	1,945	103.4	525,000	5,181,605
Est	4,962	1,755	850.5	584,000	6,552,894
Orléans	7,787	2,209	1,126.6	600,000	7,481,744
P. L. M.	9,666	4,263	1,231.4	800,000	14,569,833
Midi	4,056	1,151	630	250,000	4,348,576
Ouest	....	....	....	300,000	6,066,536
Etat	9,028	2,746	1,173	....	600,000
Ceinture	128	104	36	....	183,202
Cies secondaires	1,564	256	141.7	213,517	416,410
Total	40,717	14,427	5,293	3,272,517	45,400,800
		19,720			

Kilometer = 0.621 miles. Franc = 19 cents in United States currency.

RECEIPTS, EXPENDITURES AND NET PROFITS.

YEARS	Gross receipts with tax taken off	Working expenses	Net profit	Coefficient of operation	Rates of remuneration capital
	Millions (francs)	Millions (francs)	Millions (francs)	Per cent	Per cent
1841..	13	8.3	4.7	64	....
1850..	96	45	51	47	3.75
1860..	418	188	230	45	4.67
1870..	634	313	321	48	3.95
1880..	1,061	539	523	50	4.75
1890..	1,154	607	548	51	3.85
1900..	1,517	824	693	54	4.10
1910..	1,828	1,099	729	60	3.86
1912..	1,997	1,264	733	63.3	3.72

Franc = 19 cents in United States currency.

The division for 1912 among the different companies was as follows:

COMPANY	Gross receipts with tax taken off	Working expenses	Net profit	Coefficient of operation
	Millions (francs)	Millions (francs)	Millions (francs)	Per cent
Nord...........	325	199	126	61.27
Est............	291	175	119	60.35
Orléans.........	302	169	133	55.03
P. L. M........	588	332	256	56.62
Midi...........	143	76	67	52.88
A. R...........	69	63	6	91.4
Etat...........	242	216	26	89.4
Ceintures.......	20	21	1	113.2
Petits reseaux...	16	10	6	60.5
Total......	1,997	1,264	733	63.3

Franc = 19 cents United States currency.

In these two tables the coefficient of operation is the relation of working expenses to gross profit. The rate of remuneration on capital has been determined by comparing the net profits with the capital of establishment. The liquidation charges on the capital are not taken into account.

Traffic.— The progressive development of traffic and lowering of rates from 1841 to 1904 was as follows:

YEARS	Total distance covered		Mean tariff per kilometer		Mean receipts per kilometer
	Passengers	Freight	Passengers	Freight	
	Millions of kilometers passengers	Millions of kilometric tons	Centimes	Centimes	Francs
1841..	112	38	7.00	12.00	26,000
1850..	797	462	6.66	7.7	32,700
1860..	2,921	120	5.64	6.92	45,600
1870..	4,272	5,057	4.95	6.14	40,800
1880..	5,863	10.500	5.04	5.95	46,000
1890..	7,943	11,759	4.40	5.46	35,000
1900..	14,063	16,557	3.67	4.69	39,800
1910..	16,907	21,984	3.51	4.27	45,400
1912..	18,178	24,878	3.48	4.20	48,880

Franc = 100 centimes = 19 cents in United States currency. Kilometer = 0.621 miles. Metric ton = 2,205 lbs. avoirdupois.

Division among the companies of the traffic for 1912 was as follows:

COMPANY	Total distance covered		Mean tariff per kilometer		Mean receipts per kilometer
	Passengers	Freight	Passengers	Freight	
	Millions of kilometers passengers	Kilometric tons millions	Centimes	Centimes	Francs
Nord......	2,933	5,085	3.455	3.721	84,662
Est........	2,477	4,640	3.17	4.18	58,428
Orléans....	2,900	3,266	3.41	7.43	38,730
P. L. M....	4,646	7,323	3.87	8.47	60,960
A. R.......	707	651	2.92	4.66	22,809
Etat........	2,924	1,892	3.21	4.74	41,051
Midi......	1,380	1,708	3.48	5.96	35,714
Ceintures...	108	203	2.42	6.68	....
Petits reseaux....	102	109	3.87	8.58	11,114
Total....	18,178	24,878	3.44	4.20	48,880

1 franc = 100 centimes = 19 cents in United States currency. 1 kilometer = 0.621 miles. Metric ton = 2,205 lbs. avoirdupois. The number of kilometric passengers or tons is the sum of kilometers covered by each passenger or by each ton of freight.

M. DE SAINT AMAND,
Engineer to the Chemin de Fer du Nord.

23. FRENCH MERCHANT FLEET. If a study is made of the French merchant fleet covering a period of more than a century and its importance compared with the maritime traffic in France, one cannot help being struck by the fact that the commercial fleet sailing under the French flag has never been in proper proportion to the maritime traffic of the different French ports.

The present situation as disclosed by the figures leaves no doubt in this respect. If the last normal year (1913) be taken as an example, it will be seen that the maritime trade holds, as regards French exterior trade, a preponderating place, no matter under what aspect it is considered. Merchandise forming the exterior trade of France in 1913 weighed no less than 78,800,000 tons. Of this, trade by sea accounted for 40,000,000 tons, or 54 per cent. From the point of view of weight of merchandise, maritime trade therefore accounted for more than half of France's exterior trade. If the value of the goods is considered, and not their weight, the result is even more striking. The general exterior trade of France in 1913 represented 20 milliard of francs ($4,000,000,000). Of this sum maritime trade accounted for 13 milliard of francs ($2,600,000,000), or 65 per cent. As regards the value of the goods making up this exterior trade, sea traffic represented two-thirds of the total. Before the war, consequently, despite the considerable development of our commercial relations with Belgium, Germany and Switzerland, France carried on a vast sea trade with foreign countries. It is nevertheless a fact that the part played by France in sea trade was relatively small when compared with that of other countries. Imports amounted in 1913 to 22.56 per cent as regards weight and 38.8 per cent value. The exports were 56.95 per cent weight and 57.1 per cent value. The result of this situation is that France paid in 1913 to foreign vessels an amount of 414,000,000 francs ($82,800,000) in freight charges.

History.— The most serious point is the disproportion which is continually increasing between the importance of the French maritime traffic and its merchant fleet. This can easily be realized by quoting a few figures from old statistics. Up to the end of the 19th century the statistics of the French Customs Administration gave the value of imports and exports, distinguishing between traffic by land and sea; but without indicating weights. We are, therefore, obliged to base our comparisons on the value of the merchandise carried at a fairly remote period which gives a less exact idea of the problem under consideration. As a matter of fact, the important thing to be considered when studying the maritime transport industry is more the weight of the goods transported than their value. However, useful conclusions can be drawn from the figures appearing in the statistics. In 1822 ships flying the French flag carrying transports of French origin and destination represented 61 per cent. In 1835 it fell to 48 per cent. This percentage was maintained during the reign of Louis Philippe, reaching 48.9 per cent in 1850. In 1866, on the eve of new legislation (law of 19 May 1866) establishing equal treatment for all ships in French ports, the percentage fell to 43 per cent. From this time onward, it continued to decline rapidly owing to competition with foreign ships, and in 1880, before any new legislation was made to protect it, it only represented 37 per cent. These fluctuations are shown in the following table:

VALUES EXPRESSED IN MILLIONS OF FRANCS.

YEARS	Value of imports and exports carried by French ships	Value of imports and exports carried by foreign ships	Total	Percentage of French ships in this total
1822.......	316	197	513	61
1835.......	532	560	1,092	48
1850.......	976	1,017	1,993	48.9
1866.......	2,500	3,196	5,696	43
1880.......	2,727	4,458	7,185	37

More precise information is available for recent years. We know, for instance, that in 1900, ships flying the French flag accounted for 26.18 per cent of imports, while exports amounted to 50.82 per cent. If a comparison is made of the figures quoted for 1913 and 1900 it will be seen that there was an improvement in exports but a diminution for imports. As regards the freight charges paid by France to foreign countries, this amounted in 1900 to a little more than 300,000,000 francs ($60,000,000) or an increase of $22,800,000 in 13 years.

In presence of the declining rôle played by the French merchant fleet in the national maritime traffic it is permissible to enquire into the general causes which have brought about such a state of affairs.

Causes of the Inferiority of the French Merchant Fleet.— It should first of all be remembered that up to 1866 the French flag had been protected by adequate measures, such as reserving certain traffic for French ships and giving them an advantageous differential treatment for other traffic. A very close interest, therefore, united the exterior maritime trade with the national flag, as was the case, moreover, in foreign countries. In 1860 the English were the first to renounce this system of privileges and protection which had been followed by all the merchant fleets of the maritime countries of Europe during the 17th and 18th centuries. There was every advantage to the English in taking this step as their trade did not fear rivals at that time. France was dragged into the movement, and by the commercial treaties of 1860 suppressed the greater part of the customs dues which protected its markets, and established by law of 19 May 1866 complete equality for all ships entering its ports. It was, however, found that the French commercial fleet was unable to support the competition to which it was suddenly subjected. Despite the general increase of commercial activity, the French merchant fleet only made slow progress and was outstripped by those countries she had formerly rivaled.

As far back as 1869 public opinion became uneasy regarding this situation and an investigation was ordered with a view to placing the French merchant fleet on a better footing. The tragic events of 1870 prevented the proposed program from being carried out, and it was in 1881 only that a law was promulgated protecting the merchant fleet. In 1893 a new system was inaugurated, which was replaced later in 1902 and once more modified in 1906. The main lines of this new legislation were the establishment of certain premiums and compensations for equipment of French ships, the conditions varying with each new law. At times sailing vessels were favored, while at others they were harshly treated. Sometimes navigation premiums were paid according to the distance covered and sometimes compensation for equipment was granted corresponding to the number of days taken up in the administrative equipment of the ship. At other times ships constructed in France alone profited by these laws while at other periods vessels built abroad were placed on the same level as the former. The same criticism can be applied to all these legal texts, i.e., that instead of encouraging French shipbuilding they established a certain policy which had to be strictly followed and which did not tend to improve the shipping industry. However, the law of 19 April 1906 — the most recent one — instituted a system which has been in vogue for the last eight years before the war and which has given interesting results. The gross tonnage of the French commercial fleet in 1906 was 2,047,952, and 2,498,285.92 in 1914.

The abnormal situation in which the French merchant fleet was placed on account of the return to a protection tariff greatly favoring agriculture and various categories of industries should also be noted. It is a fact that maritime transports do not trade throughout France to their full capacity. Customs protection cannot therefore be extended to them. On the other hand it can do them a lot of harm indirectly because it impedes international trade dependent on maritime transports. It was to parry this abnormal state of affairs that the system (an artificial one) of allowing premiums and compensation for equipment was established; or in other words privileges were granted, theoretically, with a view to counterbalancing the serious situation outlined above. But other causes of a geographical and economical order, independent naturally of customs legislation, explain why the French commercial fleet is not on the basis it should be with respect to the exterior trade of France.

Let us commence by examining the geographical causes. It has frequently been considered that France derived great advantage from the fact that she is bordered by three different oceans, with an important number of ports. This was, of course, of undoubted advantage when ships were of small dimensions and when land transports did not concentrate on a certain number of ports. To this system of dispersion, modern conditions of maritime transportation and transportation by railway have substituted a system of concentration. The large ports of to-day are the cross-roads of sea routes and land routes serving as junctions for distant destinations. Secondary ports of course play a lesser rôle. On the other hand it is in the national interest that every effort be made to confine activities to limited numbers of ports, of modern construction and equipped with adequate machinery to deal rapidly with the loading and unloading of large tonnage ships. Whereas in some countries, Germany for instance, a choice of ports is limited — Bremen and Hamburg — a certain indecision was maintained in France, due to local jealousy, with the result that competition has been keen between quite a number of French maritime ports. In other words, if there are numerous French ports able to harbor ships of an average tonnage, none of them are as well equipped as Antwerp, Hamburg or Liverpool. This naturally makes its repercussion felt on the French commercial fleet which is practically dependent on national traffic.

Another very serious result of a geographical order is the transfer of the European maritime trade from the Mediterranean, which was the great traffic centre at the end of the 18th century, to the North Sea, where to-day most of the merchandise is handled. English, German, Dutch and Scandinavian vessels are accordingly near the source of the large freight traffic of Europe, and when making long distance voyages they have access to French ports, thereby being in a position to complete their cargoes on the outward journey or unloading part of their goods on the return trip. French ships on the contrary only have at their disposal French freight or freight from the Mediterranean. If French ships desire to secure a part of the large freight traffic of the North Sea they are obliged to make a trip to northern waters, thus increasing their operating expenses. On first thought it might be objected that the French commercial fleet does not suffer from lack of freight, for, according to the figures previously quoted, France has insufficient ships to transport the mass of goods making up her whole maritime traffic. But it should be remembered that in freight matters it is not only quantity which counts, the nature of the merchandise also plays an important rôle. As regards France, the goods making up the exports are rarely of a very heavy character.

France does not produce a sufficient quantity of coal to satisfy her needs (40,000,000 tons as against 60,000,000 consumed); she cannot therefore follow the example of England who is able to assure freight in coal exports.* Again, France does not export vast quantities of metallurgical products like Germany (potash salts for instance); neither is she in a position to export a large amount of coal like Germany, who, although exporting a quantity greatly inferior to England, is nevertheless able to supply its ships with a not to be despised cargo of this combustible. Finally, France does not possess, like the United States, the enormous export freight constituted by its grains, meat, cotton and petroleum. Exports from France generally consist of light materials which is much appreciated by ships from the North anchoring in our ports as same serves to complete their cargoes. It will, therefore, be seen that French goods are more adaptable as cargo for foreign ships touching our shores than to French vessels attached to their respective ports.

To these geographical and economical causes must be added reasons of an administrative nature. The regulations covering the merchant fleet are more onerous and complicated in France than in any other maritime country of Europe. The recent law of 17 April 1917 regarding the security of navigation and regulating the work aboard merchant ships has added to the already heavy burden laid down by former laws. Furthermore, the discipline of the crew is less well assured in France than it is in other European countries possessing a merchant fleet. For instance, the Decree of 24 March 1852 covering discipline, although modified on several occasions, is still considered as inadequate to meet modern conditions and its revision was decided upon. This task was confided to the Conseil Supérieur de la Navigation Maritime which, after a long and minute examination by a special commission, in which all interests were represented, has drawn up a draft defining the respective rights and duties of shipbuilders, captains and crew. Unfortunately the government responsible for the draft in question did not insist on a Parliamentary debate, with the consequent result that uncertainty exists regarding questions of discipline as the texts of the old law are severely criticised and liberties taken with them while the text of the draft has not yet been made law.

The foregoing show the difficulties handicapping the French merchant fleet at the outbreak of war.

But a wrong idea might be formed of the situation if account is not taken of the urgent necessity of providing cargo boats to meet the needs of French maritime traffic.

Necessity of a French Commercial Fleet for the Development of French Exportations.

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* In 1913 England exported 76,000,000 tons of coal without taking into account the 21,000,000 tons of bunker coal taken by ships landing at English ports, thus making up a total of 97,000,000 tons.

— Some large countries carrying on extensive exportation trade by sea present the curious contrast that their sea trade has developed while their own shipbuilding declined. This was especially the case with the United States during the period extending from 1865, i.e., at the end of the Civil War, to recent years. In 1860 American ships accounted for two-thirds, to be precise 66.5 per cent of the maritime transportation between the United States and foreign countries. In 1914 it only amounted to 8.6 per cent. During this time the exterior commerce of the United States increased from 4 milliard to 21 milliard francs ($800,000,000 to $4,200,000,000). This anomaly is explained by the fact that of the 11 milliard francs, ($2,200,000,000) representing almost the whole of the American merchandise exported in 1912, about 5 milliard ($1,000,000,000) of these goods enjoyed a sort of monopoly, that is to say, that this merchandise was unable to be produced in any quantity in the countries sending their ships to America to procure it. The goods were:

450,000,000 francs — cereals and by-products
835,000,000 " — fresh or preserved meat
2,830,000,000 " — cotton
530,000,000 " — petroleum

France is naturally not in a similar position. She has neither the abundant resources of new countries possessing an excess of agricultural products and supplying them to densely populated countries, nor any of these products of which a capricious nature has given a sort of monopoly in certain regions. Consequently, most of the goods exported by France are similar to those exported by other countries whose ships accordingly compete with our own in home ports, particularly England and Germany.

The French exportation amounts to a total annual sum of about 7 milliard francs ($1,400,000,000) compared to 6 milliard 880 millions ($1,376,000,000) in 1913. Of this total, about 60 per cent is represented by manufactured articles, that is to say, goods able to be produced in other countries, and especially in those competing on a large scale with the French merchant fleet. It is therefore no exaggeration to say that France leaves to her competitors the care of transporting much of the merchandise making up her export trade.

But the subject should not be dismissed by the bald statement that the reason for the inferiority of the French merchant fleet is because France practically confines her exports to manufactured goods. A more thorough investigation should be made and an analysis taken of the products exported. Most of them consist of articles of luxury, which recommend themselves by the elegant manner in which they are presented and the hall mark establishing their quality. Very few exporters seek a cheap market for these goods. Now it should be borne in mind that buyers are judges of the price of goods, while on the contrary they are often unable to distinguish between the finely finished article and that of the cheap and crudely made substitute. This is a thing one has to be educated up to. In this category of goods are the following: nearly all textile products, clothes, articles of fashion (ladies' dresses, lingerie, hats, etc.). This group represents about one-third of the value of all French exportations. The following are some of the figures:

Silk, floss silk, silk tissues	588	millions.
Cotton and cotton fabrics	511	"
Wool and woolen fabrics	632	"
Flax and hemp	69	"
Clothes and lingerie	252	"
Hats, artificial flowers and feathers	136	"
	2,188	"

There is no doubt that some of our large dressmakers and fashion houses escape the danger of delivering their wares through the intermediary of foreigners on account of the frequency of the personal business relations of their overseas clientèle with them. Strangers residing a short while in Paris or passing through the city undoubtedly create a strong link between these producers and themselves which greatly adds to the development of this branch of our exportations. But this clientèle, although constantly renewed by several visits to France, is as constantly curtailed by the fact that once the clients return to their home country they are obliged to have recourse to an intermediary for the reception of any further goods. The Germans, especially, make great efforts in distant European countries to substitute the Berlin fashion for the Paris fashion and whatever prestige the latter still retains, the good taste of people must not be too blindly relied on to allow us to overlook the danger with which we are threatened.

Even in the matter of non-manufactured products there are certain articles of export which it is necessary to have presented to clients by an intermediary who is more or less a connoisseur of their specialty. For instance, wines and liqueurs, which represent an annual exportation of 265,000,000 francs, should not be delivered to distant clients through English or German shipping agencies, as they run the risk of being supplanted by such substitutes as Australian claret, Australian burgundy, Moselle or Rhine wines and even "Deutsches Kognac" manufactured in the open port of Hamburg. In addition, it should be noted that in the list of French exports not classed in the statistics figure 566,000,000 francs of parcels post and 656,000,000 francs of undenominated goods, or a total of over a milliard francs, in which manufactured articles and "objets de luxe" certainly play an important rôle.

The greater part of French industries, therefore, need to be exported by a properly organized national service which would avoid the use of intermediaries in whom one encounters dangerous rivals. Thanks to their merchant fleet the Germans have been able during the last 30 years to place on all the markets of the world German goods which before that period were practically unknown. Undoubtedly the persevering efforts of the German traders have accounted for much to achieve this result, but the transportation by German ships and the delivery of the goods by German intermediaries resulting therefrom were a necessary condition of success. Let it be further remembered that the German product, being nearly always cheaper than that of its competitors, has less need of recommendation to prospective purchasers than the better and more elegant — but generally dearer — article of French fabrication.

Under these conditions any improvement of the merchant marine in France is dependent not only upon efforts displayed by the government and shipbuilders but also by the wholehearted support of shippers in general. Shippers should be made to realize the importance of the eventual destination of their merchandise, and not become more or less disinterested in its fate once the goods have been dispatched and an invoice sent. It is indispensable for them to follow up the shipment to the very door of the client, and the intermediary naturally designated for such a task is unquestionably the agent of a regular French navigation company. It is not too much to say that owing to the very nature of the French export trade, a close union of the shipbuilding industries and this export trade is an essential condition of success for the one as for the other.

The Critical Situation Created by the War.— On 1 Jan. 1914 the French commercial fleet comprised 2,498,285 raw tonnage. To 1 Jan. 1917 the tonnage of French merchant fleet sunk through acts of war (mines, submarines, etc.) amounted to 311,271 tons. As very few ships have been added to the French merchant fleet since the outbreak of hostilities, the tonnage at the commencement of 1917 was reduced to 2,265,000 tons. These figures sufficiently prove the serious character of the situation.

This situation is not due entirely to submarine losses. It is greatly aggravated by the almost unsurmountable obstacles encountered during the first three years of war by the French constructors to make good the losses. These obstacles are of two kinds: (a) impossibility of constructing ships in France; (b) impossibility of procuring them from abroad. The impossibility of construction in France is easily explained by the fact that raw material (sheet iron, angle-iron, profilés) indispensable for naval construction can no longer be furnished by the French metallurgical manufactories as most of them are located in the invaded districts of northeastern France. To understand this it is merely sufficient to state that in 1913 the departments of Meurthe and Moselle alone produced 19,798,000 tons of iron ore of the 21,714,000 tons extracted throughout France. Furthermore, the steels which it was possible to procure, either from neutral or allied countries, were all exclusively reserved for direct war purposes. The naval shipbuilding yards were themselves, at the request of the government, transformed into munition factories for the making of shells. Moreover, these shipbuilding yards had the greatest difficulty to finish the ships in an advanced stage of construction but which were still on their stocks. There was no question, therefore, of undertaking new naval construction, which scarcity of labor, moreover, would have made difficult of realization.

Finally, as the submarine warfare became more intense, each maritime country awoke to the necessity of jealously reserving its own ships for its own needs. England, at first, quickly followed by the Scandinavian countries, the United States (1916) and lastly Japan in September 1917, successively forbade the transfer of their national flag. Under these circumstances not only was it impossible to replace lost merchant vessels by new units but the exploitation of foreign ships under the French flag was also out of the question. It was only when matters reached an acute crisis that the proper authorities took steps to obtain supplies of steel from France's reserve stock necessary to construct some 20 small vessels (1,400 tons) for delivery in the spring of 1918.

The need of reconstituting the French merchant fleet was still further accentuated by the fact that apart from loss of tonnage mentioned, the bulk of merchandise to be handled in the French ports during the war was following an ever upward tendency. This is easily explained by the fact that before the war France's exterior commerce by land was principally transacted with Germany and Belgium. Thus, owing to the war, these two land routes were closed to her. Again, if French exports by sea have declined since 1914, importations on the other hand have increased in such proportions that the total mass of maritime commerce has reached a much higher figure.

We quote a few figures taken from statistics compiled at the ports. By taking the total figures affecting merchandise disembarked and embarked in the 40 principal ports of France we find the following:

1913	42,296,665 tons.
1914	35,005,498 "
1915	42,265,903 "
1916	56,673,098 "

But if only goods disembarked in the same ports are considered the proportion in the increase is much greater, as will be seen from the following figures:

1913	31,884,516 tons.
1914	27,223,519 "
1915	40,155,884 "
1916	51,502,755 "

These figures do not furnish any indication from the point of view of importance of the French maritime traffic after the war. They do possess, however, a permanent interest because they show the receptive capacity of the French ports which have been able to handle in 1916, under particularly difficult circumstances, 20,000,000 tons more imports than in 1913. An idea can thus be formed of the future possibilities of the maritime trade in the ports of France.

The lesson to be learned, therefore, from the critical situation caused by the war is the absolute need of a powerful French merchant fleet; such a fleet did not exist in peace times, and the need for the same was imperative in the two cases. Serious obstacles will have to be surmounted before this fleet can be properly developed. However, the teachings of the present war prove in an irrefutable manner the necessity for manufacturers to preoccupy themselves with means of maritime transportation which forms such a link between them and their foreign clientèle. Moreover, once the war terminated it will be possible not only for French shipbuilders, but also for all those other industries which suffered so cruelly during the years 1914–18, to procure either abroad or in the French market that machinery indispensable for naval construction.

It is only fair to state that certain of the obstacles cited above regarding the development of the French merchant fleet in normal times are gradually being overcome and some are on the point of being entirely eliminated. As a case in point we might mention the large source of heavy freight which French maritime enterprises might derive from the operation of the iron mines of Normandy and Brittany. As recent as 1913 1,000,000 tons of iron ore was embarked at Caen or Saint Nazaire. The considerable development of the metallurgical industry in the west of France during the years 1914–18 leads one to suppose that this figure will increase in large proportions in the future.

To sum up, the crisis which the French merchant fleet is suffering from is a serious though not an irremediable one. It can be overcome because, on the one hand, the general interest of the nation is to remedy the present situation, and on the other, the combined efforts of the transportation enterprises as well as the manufacturers or producers interested in the exterior commerce of France are capable of finding a solution to the problem.

Prepared and contributed by the
COMITÉ CENTRAL DES ARMATEURS DE FRANCE.

24. THE FRENCH ARMY. On the eve of the great war, the French army was in an evolutionary period. The recruiting of the troops, their organization, the classification of the grades, armament, etc., were all being modified along new processes and many measures in course of practice produced no other result than causing that temporary confusion so inherent to every transformation.

BEFORE THE WAR.

Recruiting, General Effectives, Budget.— The law of 7 Aug. 1913, called "the three years service bill" ratified the principle of obligatory and equal service for all French citizens. Service is contracted for 28 years, viz., three years with the active army (this time is all passed under the colors), 11 years in the Active Army Reserve, comprising two periods of training; the first of 23 days and the second of 17 days; seven years in the Territorial Army with one period of training of nine days, and seven years in the Territorial Army reserve, the men in this category taking part in reviews and eventually in sentry work on lines of communication. The "classes" are divided into parts: men fit for active service and men only apt for auxiliary service. Voluntary enlistments can be contracted by youths attaining their 18th year. Up to a figure fixed by the War Office young men possessing a certificate for military aptitude granted to them for efficiency may contract a three years' enlistment which will enable them to be discharged sooner from active service. Enlistments may be made, moreover, for four and five years, and, in case of war, for the duration of hostilities. Men undergoing their military training period may re-enlist for a total duration of 15 years. In the Gendarmerie and in certain special services re-enlistments may be contracted beyond this period. The age limits are 55 years for the Gendarmerie and 60 years for special services. The advantages derived by the men contracting re-enlistments consist in better pay, premiums and pensions. The pension is granted after 25 years' service. A proportional pension is allowed after 15 years.

The Colonial troops are formed of young men demanding such service, voluntary enlistments, re-enlisted men and young men residing in the colonies. Special privileges are granted to the enlisted and re-enlisted men in this category. The Algerian native troops are recruited by enlistments and re-enlistments and by means of classes (calls to the colors) wherein the principle of replacement is allowed.

The black troops of West Africa are also recruited by enlistments and re-enlistments and by properly authorized calls according to the local customs. The census taken in 1911 for France showed a population of 39,601,509. The figure for the colonies, for the same period, was about 60,000,000. In 1912 there were 314,369 conscripts, from which had to be deducted a number of men unfit for service, men previously rejected and men who had already contracted enlistments, which reduced the number to 240,502. The number of troops for 1914, not including colonial troops, was 28,519 officers, 762,450 men and 187,317 horses. The war credits for France in 1913 amounted to 4,738,603,534 francs ($947,720,707). Of this sum military expenses accounted for 983,224,376 francs ($196,644,875) for the army and an amount of 488,941,062 francs ($97,788,212) for the navy.

High Command and Central Administration.— The constitutional laws of France provide that the army be placed under the nominal command of the President of the republic. The War Minister is the acting chief. A Superior Board of the National Defense (decree of 14 June 1913) examines all questions regarding the co-operation of the various ministries. The Superior War Council studies all questions relating to the preparation of war. It is composed of the Minister for War, his general staff and 10 generals selected by the high command in case of war. The general staff of the army (decree 14 May 1912) is divided into two groups. The first group is concerned with the preparation of war plans, the second looks after current affairs. The chief of the general staff is assisted by two superior officers. The first of these, who is at the head of the first group, holds the rank of major-general in time of war, the other at the head of the second group, remains at the ministry once the mobilization order is issued. The Under-Secretary of War (decree of 16 Feb. 1914) is in charge of administrative affairs.

The directing bodies are divided up as follows: The Board of Control prepares the budget, centralizes the accounts, has an administrative control over the infantry, cavalry, artillery, engineers, quartermaster, munitions and sanitary services, over the Colonial troops and all questions dealing with the various arms and services. The Technical Board, acting under the direct authority of the War Minister, is responsible for unity of direction and fulfils any technical missions that may be confided to it. The principal missions are: Inspection of cavalry, unmounted artillery, coast batteries, engineering service, schools, aeronautics, automobiles, reserves, military preparation, etc. Technical committees and permanent or temporary commissions study those questions of a more important technical order. The territory is divided into 21 regions as follows: 1, Lille; 2, Amiens; 3, Rouen; 4, Le Mans; 5, Orleans; 6, Châlons; 7, Besançon; 8, Bourges; 9, Tours; 10, Rennes; 11, Nantes; 12, Limoges; 13, Clermont-Ferrand; 14, Lyons; 15, Marseilles; 16, Montpellier; 17, Toulouse; 18, Bordeaux; 19, Algiers; 20, Nancy; 21, Epinal.

Each region is itself divided into several subdivisions possessing one or more recruiting offices. The two large centres of Paris and Lyons possess a military government, headed by a governor.

Ranks.— The military hierarchy comprises the following grades: Private, corporal, sergeant, sergeant-major, candidate for commission, adjutant, adjutant-chief. After this classification the officers follow in the order hereafter indicated: Second lieutenant, lieutenant, captain, major, lieutenant-colonel, colonel, brigadier-general, general, marshal. The title of *fourrier* bestowed on a private indicates employment as a clerk. In the cavalry the rank of brigadier corresponds to that of corporal in the infantry, while sergeants and sergeant-majors are called «marechal de logis» and «marechal des-logis-chef.» The title of major added to that of captain or commander indicates an administrative function. The title of adjutant-major added to the rank of officer indicates a function of assistant to battalion or regimental chiefs.

Generals of division, called upon to command army corps in peace time, and armies and groups of armies in war time, are invested with authority placing them on the same level as regards rank. Non-commissioned officers consist mostly of men who, on conclusion of their service, have reached the necessary standard to be enrolled in their respective rank at mobilization. Professional non-commissioned officers are constituted by means of re-enlistments. These re-enlistments carry with them certain privileges such as higher pay, bonuses, pensions and civilian employment reserved for them once their service is concluded.

The recruiting for officers who make a career of the army is undertaken in three different ways: (1) The large Military Schools.— The famous military school of Saint Cyr, where pupils are received after passing the mathematical class A secondary examination, furnishes officers to the infantry and cavalry after two years' training. The Polytechnic School — pupils admitted after passing special mathematical examinations — furnish officers to the artillery and engineers after a two-year course of training. Some of the pupils on the termination of their studies set up in practice as civil engineers. In such a case their status in the army is that of reserve officer. The pupils of these schools spend two months with a corps troop at the end of each year's studies, the first time as a private soldier and the second time as a non-commissioned officer (law of 7 May 1913). (2) The schools for non-commissioned officers and candidates for commission are military schools to which are sent non-commissioned officers who have completed two years' service in this grade and have satisfied while so serving the standard of capacity and have passed the examinations set corresponding to the superior primary test. (3) The adjutants or sergeant-majors having served at least 10 years as non-commissioned officers are appointed by decree of the President of the republic — on recommendation of their superior officers in a proportion not exceeding 1.5 per cent of the vacancies to be filled. In addition to these three categories, the law of April 1913 provided for the recruiting of a certain number of officers in the active army by the admission of reserve officers on their fulfilling certain conditions. The declaration of war interrupted this experiment before appreciable results could be obtained. The preparatory schools receive the sons of soldiers with the object of preparing them for an army career. The Prytanée Militaire de la Flèche receives sons of officers and sons of state officials, gives them a complete secondary training and prepares them for admission to the military schools. Most of the pupils are admitted free of charge. The Ecoles préparatoires d'Enfants de Troupe receive sons of non-commissioned officers. They receive a primary instruction with a view to preparing them for the grade of non-commissioned officer and subsequently officer. Board and training are free on condition that the pupils contract a five-year enlistment on leaving the school.

There are four schools for the infantry, one for the cavalry and one for the artillery. L'Orphelinat Hériot receives the orphans of non-commissioned officers and officers.

The recruiting for complementary officers is undertaken by the following means: (1) *Special Reserve Officers.*— Officers of the active army may, at their request, be placed on the «special reserve» list, in determined proportions. These officers are replaced in the active army, placed on the list of reserves and called up in case of mobilization. They are obliged to undergo a period of training of five weeks every two years. They draw a pension and receive special privileges. (2) *Pensioned Officers.*— Officers in receipt of a pension are called upon to serve five years as complementary officers after they have ceased to belong to the active branches of the army. They may, however, at their request, be maintained in the reserves after this period of five years has elapsed. The officers pensioned off before the completion of their 25 years' service still belong to the army until the expiration of such period. (3) *Officers Resigning Their Commission.*— Officers of the active army may be called upon to serve in the reserves in their respective grades. (4) *Pupils of the Large Schools.*— The pupils of the Polytechnic School, designated for employment in state civilian services or resigning when leaving the school, the pupils of the École Forestière, École Normale Supérieure, École Nationale des Mines de Saint Etienne, École Centrale des Arts et Manufactures, École des Ponts et Chaussées, are liable to serve as reserve officers. By the terms of the law of 1905 these young men complete one year's training in a corps troop, under ordinary conditions, and follow during this period a course of studies preparing them for the grade of officer. The law of 1913 modified these arrangements by substituting for the one year's service a military training carried out in the schools themselves with an annual period of two months in a troop corps during the course of the studies. These arrangements, which only applied to the École Normale Supérieure, the École Forestière and the École Polytechnique, up to the present have operated but very little. (5) *Non-Commissioned Officers of the Active Army.*— The discharged non-commissioned officers who have received a diploma for aptitude on the recommendation of their chiefs and who possess the necessary training and social status may be nominated reserve officers. They can, while not actually ranking as an officer, hold a position of chief of section. (6) *Young Men Called up for Service with the Colors.*— By the terms of the law of 1905 the young men undergoing their two (or three) years' service may be admitted to the regional schools after one year's service provided they have satisfied military requirements as to aptitude. The course of studies lasts six months. On leaving these schools they may be called upon to undergo a period of six months' training in a troop corps in the grade of non-commissioned officer. The law of 1913 granted these young men permission to enter the military schools, admission being allowed after one year's service. The studies last one year. The men accomplish their third year's service, first as candidates and finally as non-commissioned officers, during the last six months. These dispositions are not yet in force. The officers of the territorial army are recruited from among the reserve officers.

Promotion.— Promotion in the active army is gained partly through seniority, partly through choice. Second lieutenants are promoted first lieutenants automatically after two years' service. For the other grades up to and including battalion chief promotion is granted according to seniority. But every year the Minister of War, on recommendation from the proper officials, draws up for each branch of the service a «promotion» schedule promoting specially chosen officers. The promotion of officers so chosen is one-third for captains and one-half for battalion chiefs. From the rank of lieutenant-colonel all promotion is by choice. In the reserve and territorial armies second lieutenants are promoted first lieutenants after four years' service, the other grades being by choice. The minimum period of seniority to rise from one grade to another is two years for a lieutenant, four for a captain, three for a major, two for a lieutenant-colonel and for grades above that three years. This period is just one-half in war time. Promotion in the ranks is entirely by choice with a minimum of seniority. The private soldier should reckon on serving six months before being promoted to corporal, etc.

General Staff.— In peace time besides the Army General Staff there exist staffs for army corps, divisions and brigades. Their personnel is composed of gazetted staff officers and administrative officers of the General Staff, the latter being more particularly concerned with carrying out orders emanating from the cabinet or government. The recruiting of gazetted staff officers is undertaken at the Superior Military School. Officers fulfilling requirements as to age, seniority of rank and command may participate in the annual examination on recommendation of their superior officers. This examination or competition is drawn up by the Minister of War. The pupils admitted follow during two years the course of studies at the Paris school. They are gazetted staff officers on termination of their studies provided they have satisfied the necessary tests. The grade of staff officer can be attained by superior officers and captains not having followed the course of studies at the military school but having satisfactorily passed the tests equivalent to those required by candidates belonging to the school. Such cases are, however, exceptional. Gazetted officers on leaving the school are attached for two years to general staff officers to complete their training. After this period they must serve in the branch of their service as commander for two years. They have served a certain length of time previous to their admission to the General Staff in other branches of the service than that originally chosen by them.

The principal branches of the army are: The Control, charged with safeguarding the interests of the Paymaster's Department and, in the administrative services, with supervising the proper application of decrees and laws.

The controllers form a special corps with its own governing body. The Artillery Service attends to the general direction of the branches of this service and its proper working by means of a special General Staff. The Munitions Service is confided to military engineers with its own governing body. The Engineers Service looks after this branch of the service and assures its proper running in the schools for engineers. There follow the Aeronautic Service, the Sanitary Service, the Veterinary Service, the Military Justice and Penitentiary Service, the Recruiting Service, the Paymaster Service, the Post and Telegraph Service, the Railway Service, the Automobile Service, etc.

Troops.— The law of 15 April 1914 provided for the following organization, the program of which was not entirely realized at the time of mobilization:

The infantry comprises 173 regiments of 3 battalions of 4 companies, 31 battalions of «chasseurs» of which 12 are specially designated to serve in the Alps, 6 regiments of «zouaves,» 12 regiments of Algerian sharpshooters, 2 regiments of the Foreign Legion, a variable number of Saharian companies, the Paris regiment of sapper-firemen, and special disciplinary sections. The officer-personnel of an infantry regiment comprises, besides the normal units, a complementary body destined for the needs of mobilization. It comprises one lieutenant-colonel (in addition to the one seconding the colonel), two battalion chiefs, six captains, three adjutant chiefs and three adjutants. Each company has one captain, two lieutenants and one adjutant. Ten cyclist groups, one attached to each cavalry division, are formed by certain battalions of «chasseurs.» Commanded by a captain, each one of them is divided into two platoons. The platoon, commanded by a lieutenant, contains seven non-commissioned officers and 100 «chasseurs.»

The cavalry comprises 93 regiments, as follows: 12 cuirassiers, 32 dragoons, 23 «chasseurs à cheval,» 14 hussars, six African «chasseurs,» six Algerian «spahis.» There are, moreover, four Algerian-Tunisian remount companies and 17 cavalry remount groups in France. The cavalry regiments are composed of four active squadrons and one depot squadron. The number of squadrons in Africa may be modified by ministerial decree. Brigades of cavalry are provided with wheeled-machine-gun sections.

The field artillery comprises 62 regiments in three or four groups of batteries and eight autonomous groups of field and mountain artillery in Algeria-Tunisia and Morocco. Thirty batteries of horse artillery are divided over the field artillery regiments. In all there are 618 batteries mounted in France and 17 outside of France. The heavy artillery forms five regiments, in all 34 batteries. The mountain artillery forms two regiments, 14 batteries in

France and eight outside France, including the autonomous groups. The foot artillery forms nine regiments in France. In all 89 batteries, of which 30 are coastal and 59 land — two autonomous groups in Algeria-Tunisia of four batteries each.

The engineers are composed of nine regiments of sapper-miners of 25 battalions. Besides two battalions forming a corps, one regiment of sapper telegraphers of four battalions and two battalions forming a corps in Algeria-Tunisia unite all the units of this arm of the service without distinction of specialty. The troops of the Aeronautic Service comprise: (1) Seven companies; (2) Sections, the number of which is determined by ministerial decree; (3) One company of conductors. These units are formed into groups making one corps.

The "Train des Equipages" (Supply Train) forms 21 squadrons of three companies, in which are included a few companies from Algeria. The troops of the administrative and sanitary service make up sections of secretaries to the staff officers and recruiting officers, sections of clerks and laborers and sections of hospital attendants, orderlies, etc., forming a corps. The Departmental Gendarmerie (Constabulary) form 27 legions, 25 of which for France, one for Algeria-Tunisia and one for Paris. The legion is subdivided into departmental companies and the company plus a certain number of mounted or unmounted brigades are spread over different regions according to the needs of the service. The Colonial Gendarmerie forms a few detachments. The Republican Guard of Paris consists of three battalions and four squadrons. The "Corps de Douanes" (Customs) and "Chasseurs Forestiers" (Foresters' Corps), attached to the Territorial Army, are dependent in peace time on the Ministry of Finance and Ministry of Agriculture, respectively. The Saharian troops, of variable strength, form four companies. The Colonial troops, autonomous and distinct from the Home (Metropolitan) Army form 24 regiments, a part of which is in France, and a part in the colonies: Tonkin, Cochin-China, China and Morocco Battalions forming corps at Diego-Suarez, Senegal, Madagascar and New Caledonia. Companies forming corps at Guiana, Martinique, Guadeloupe. In addition there are sections of secretaries, clerks, laborers, hospital orderlies, etc., Native troops also form part of the Colonial troops, in the following manner: One regiment of Annamite riflemen, four regiments of Tonkinese riflemen, four regiments of Senegalese riflemen, battalions forming a corps of Senegalese riflemen in various African colonies, native corps in Gaboon, Kongo, Tchad and three regiments of Madagascar riflemen. The artillery of the Colonial troops is divided up in France and in the colonies to form seven regiments and two autonomous groups, besides five companies of laborers and one company of ammunition loaders in France and six mixed companies in the colonies. Finally, two squadrons of Senegal "spahis," one native squadron in the Kongo and one in Indo-China. To these regular corps should be added a variable number of corps and detachments formed according to local and temporary circumstances for the needs of the colonies.

Mobilization.— The active army corps are completed by means of reservists from the youngest classes. They also form new corps called reserve corps, by means of reservists and complementary *cadres* from the active corps completed by the reserve *cadres*. Under these conditions each active regiment forms a reserve regiment and each battalion forming a corps a battalion. Similar dispositions were taken for the mobilization of artillery, cavalry and other corps and services.

The Territorial Army when mobilized comprises 145 regiments (one per subdivision), seven battalions of "chasseurs" and 17 battalions of "zouaves." The territorial cavalry forms a number of squadrons corresponding to the resources in horses. The territorial artillery comprises a group of batteries corresponding to each one of the active regiments. Finally, according to the military region, the Territorial Army forms one battalion of engineers, one train squadron, one section of administrative troops and one section of hospital attendants.

The large units when mobilized are divided up as follows: Divisions of infantry, comprising one staff group, two or three infantry brigades, one squadron, one artillery regiment, one company of engineers, one ambulance, one administrative convoy, etc. The army corps comprise: One staff group, two or three divisions of infantry, one brigade of cavalry, one regiment of artillery, one company of sappers, one company of pontoon workers, one park company, etc. Armies and groups of armies, formed only in war time, the composition of which is unknown.

Equipment. *Armament.*— The infantry is armed with a rifle, 1886 model, modified in 1893, of an eight-millimeter bore with magazine containing eight cartridges, of a weight without bayonet and unloaded, of 4 k. 240 (about eight and one-half pounds). Two types of machine guns; the field machine gun, Puteaux model, and the fortress machine gun, Hotchkiss model.

The cavalry is armed with a carabine of the same system as the rifle but with three cartridges; a sword and a lance for certain regiments. Machine gun on wheels of the same model as that of the infantry. The field artillery consists of a gun of 75-millimeter bore, 1897 model with recoil on gun carriage, hydraulic brake and independent line of sight. The heavy artillery includes several models: 120-millimeter short, in steel, hydraulic brake, pneumatic recuperator; 155-millimeter short, 120-millimeter long, 155-millimeter long, 220-millimeter mortar, 220-millimeter gun. The infantry soldier is supplied with 120 cartridges, the wagon attached to each company supplies 65 per man, and the ammunition sections of columns 110; in all 501.

Automobiles.— The needs of the army on mobilization are covered by requisition. The government grants premiums to owners of motor trucks and tractors.

The *Aviation* section included several hundred types of machines of different models. Dirigibles only existed in the form of a few trial models.

Uniform.— In 1914 the French army had not adopted for its uniform colors of little visibility. The question was under consideration. The greater part of the troops, particularly the infantry, were provided with red trousers and a red kepi. The «chasseurs à pied» wore deep blue trousers with jonquil borders and kepi of the same color. The kepi for the Alpine «chasseurs» was replaced by a béret. The African troops wore a red cheohia with the voluminous trousers common to the natives, red for the zouaves, blue for the Algerian sharpshooters. The cavalry was provided with a steel helmet with an elevated crest for the dragoons and the cuirassiers. The light cavalry had just adopted a similar helmet, but shorter and lighter. The cuirassiers retained the steel breastplate. The artillerymen wore a black uniform with red stripes on the trousers. The engineers wore the same colors as the artillery with the same capot as the infantry in field service uniform. A blue or khaki covering placed on the helmets and kepis, when in field dress, made the uniforms less visible.

Rewards and Distinctions.— The rewards and distinctions destined to maintain the morale of the army are: The Order of the Legion of Honor including grades of chevalier, officer, commander, great officer, great cross. These various grades are awarded to officers, and, exceptionally, to the rank and file; for seniority of service or particularly distinguished services the order is also conferred on civilians by the state. The military medal is awarded to the rank and file. It is exclusively awarded to soldiers and sailors. If it is awarded to an officer it constitutes a supreme recompense, ranking even higher than the Order of the Legion of Honor.

Various commemorative medals of certain campaigns and orders existing in countries under French suzerainty reward services rendered to the colonies.

After 2 Aug. 1914.

On the declaration of war, the opinion of all military experts was to the effect that hostilities would be of short duration, which opinion coincided with that of the most eminent economists of the day. A few months, a few weeks even, would probably witness the exhaustion of the material and financial resources of the various belligerents however well prepared or rich they might be. The military preparation of France, as well as other contemporary military powers, had been based on this conviction. Such supposition, however, was quickly contradicted by actual events which necessitated a complete transformation during the war of the resources of the nations, the principal lines of which we will outline in this article.

We have no intention of indicating in this treatise the nature of all the transformations made during the course of the war. Not only are the statistics unavailable but the secret nature of their character does not permit of their being divulged even if it were possible to compile them.

For the present we must be content with generalities from which, however, the reader will be able to glean a few ideas of the transformations which have taken place since mobilization was decreed.

Recruiting, General Effectives.—The mobilization order decreed 1 Aug. 1914 quite realised the objects aimed at by legislation. But the necessity of creating new units to meet fresh demands and keep up to standard at the same time the mobilized troops raised a problem, a few weeks after mobilization, presenting many difficulties which naturally increased with the duration of hostilities. The government was able to obtain some of its needs by calling to the colors young men fit for service who had not yet attained their 20th year. Thus the classes 1915, 1916 and 1917 were successively called up by decrees of 2 Sept. 1914, 3 Dec. 1914 and 6 April 1915 respectively. Other dispositions facilitated voluntary enlistments. The Alsace-Lorrains were admitted to the French army (law of 5 Aug. 1914). Enlistments for the duration of the war were allowed to be contracted from the age of 17 (15 Aug. 1914). A larger use was made of the native colonial troops. Long service native troops from North Africa in receipt of a pension were recalled. (Decree of 26 Jan. 1915). The number of battalions of Senegalese sharpshooters was increased. West Indian troops were called to service in France (April 1915). Enlistments for the duration of the war were open to natives of the North African colonies and protectorates.

The army is not, of course, made up entirely of combatants. Manifold are the tasks required to be performed at the rear on the lines of communication, as well as in the interior of the country for the proper administration of the army and to satisfy its ever-growing needs. As far as possible only those men unfitted to serve as combatants are employed in these services. This matter was covered, moreover, by a law fixing the conditions for auxiliary service. It should further be noted that successive laws have been the means of «combing out» many men in the auxiliary service and sending them on active service. Furthermore, in the actual zone of the army and close to the front line, trench warfare makes it possible to employ men in poor physical condition for various fatigue work. Thus there is an army of workers just behind the lines, the men fit for active service are replaced by those less fit and the latter, wherever possible, by women specially recruited for this purpose. It was in order to keep this army of workers up to strength that a decree of 27 July 1915 was issued by the terms of which enlistments could be contracted by men liberated from all military obligations, even those unfit for active service but desirous of placing their particular and professional capabilities at the disposal of the military authorities for work in offices, factories, store depots, hospitals, etc.

As early as September 1914 the government took steps to have men in the auxiliary service medically re-examined with a view to their eventual transfer to the active army. By law of 17 Aug. 1915, called the «Dalbiez Law» after its author, Deputy Dalbiez, the military situation and fitness of each man was minutely investigated with the idea of «combing out» fit men at the rear serving in munition factories, driving automobiles, etc., and sending them to the front. This law was still further reinforced by the «Mourier Law» providing for a better utilization of the mobilized forces, regulating the age limit, family situation and fitness of officers and men for obligatory service in the zone of the armies. Furthermore, the Minister of War drew up schedules covering the employment of civilians in the manifold services of the interior and replaced mobilized men by women at regular scales of pay. It was, however, only to be expected that the economical life of the country must necessarily suffer by this calling up in mass of all able-bodied men — a situation naturally aggravating with the prolongation of hostilities. The problem was still further complicated by the necessity of assuring the maximum output of war material and of carrying out those works indispensable for the proper upkeep of the country and the victualling of the population. This was provided for, at first, by mobilizing on the spot certain specialists indispensable for the proper running of factories and workshops. Steps were taken to regulate throughout the country men thus mobilized and check any abuses. A call was made on foreign labor recruited amongst neutrals or allies. Natives from Africa and Asia were brought to France to work as dockers, laborers, etc. A system of leave from the army was inaugurated allowing farmers to return to their homes for periods of 20 days renewable during the year as far as military exigencies permitted. In the surroundings of the barracks and in the zone of the armies, troops assisted in agricultural labor, gangs of men being placed temporarily at the disposal of the departmental prefects. Finally, special arrangements were made so that men in the auxiliary service were employed, as far as possible, near their domicile and left alone to pursue their usual occupations outside of service hours with the idea of their participating in the economical life of the country.

Command, Central Administration.—The general mobilization order was immediately followed by a ministerial decree (2 Aug. 1914) fixing the boundaries of the army zone. From that time onward all the territory comprised in such zone was administered by the commander-in-chief of the North Eastern Armies, while the Minister of War was in supreme charge of the interior zone. The general staff, divided into two bodies, constituted the general headquarters. The mobilized army corps were grouped together to constitute armies, which latter are afterward formed into groups of armies. In the interior, the military commander of the territory remained constituted as in peace time. However, the first and second regions were grouped into one.

The services at the war office underwent some modifications, necessitated by new military and political considerations. The most important were: the creation of Under-Secretary of State for artillery and munitions (decree of 18 July 1915) was transformed into Minister of Armament and War Equipment. An Under-Secretary of State for Food was created at the same time as the appointment of munitions minister. He was later replaced by an Under-Secretary for General Administration, an office invested with a wider scope. On the same day, also, 18 July 1915, an Under-Secretary of the Health (military) Service was appointed to replace the old health service. Finally, an Under-Secretary of Aeronautics was appointed. A system of inspections organized to supervise the proper execution of the government's decrees and the strict observation of the law underwent certain transformations. On 15 Nov. 1915 the War Minister established six «inspection» districts, at the head of each being a general assisted by a staff officer, the object being to see that the Dalbiez Law of 17 Aug. 1915 was strictly applied. Later on these inspections were suppressed and replaced by a commission appointed to watch over the better utilization of the military resources of the country, several members of Parliament serving on this commission in collaboration with the military authorities. Apart from the inspections the object of which was to bring about a better utilization of the military resources, technical inspectors were appointed for all branches of the army.

Officers.— The preconceived idea of a short, violent conflict of great battles, or «open warfare,» calling for a thorough preliminary training, excluding all possibility of a progressive preparation, lead military advisers before the war to favor the system of officering the troops by professional soldiers. The result of this conception was that, at first, France did not make use of the vast resources capable of being tapped in her civilian population, and at the same time used up in the premier engagements practically all her professional officers. If these latter had been more judiciously employed they would have been of the greatest value in future organizations for the instruction of new recruits. The question of officers was one presenting many difficulties which had to be surmounted. From the beginning it was resolved to make use of those officers previously liberated and returned to civil life. On 3 Aug. 1914 a decree was issued canceling the old law regarding age limit, and on 26 August a Ministerial order defined the conditions under which retired officers, or those having thrown up their commission, could be reinstated, the order also applying to non-commissioned officers. In this way the army immediately obtained a considerable number of officers and non-commissioned officers whose aid was most valuable in the various training centres. But the intense uninterrupted service soon told on these old servitors. Moreover, inexperienced in the ever-changing conditions of modern warfare it was with difficulty that they adapted themselves to new methods. However, it was not long before their ranks were swelled by wounded officers and non-commissioned officers, who although unfit for further active service were able to render useful service in instructing the young recruits. It was, therefore, decided to replace gradually by wounded men those old instructors who returned, with regret, to civilian life after having served their country to the best of their ability. By the terms of the law relative to promotion, no provision was made for the immediate replacement on the spot of officers killed in action. Decree of 26 Aug. 1914 provides that officers of all ranks may be promoted to a higher grade without regard to any previous seniority of rank, in a temporary capacity, and for the duration of the war, the same also applying to non-commissioned officers. Thus, promotion may be granted, according to the needs of the service, at once, even on the battlefield itself. Similar arrangements (Decree of 3 Dec. 1914) were made concerning the promotion of personnel in military bureaus.

Arrangements were also made to use as officers, after a special preparation, young men admitted after examination into the state military schools (École Polytechnique, École Normale Supérieure, etc.). Examination for entrance to Saint Cyr was re-established. However, candidates seeking commission who received their instruction at the training centres are only appointed officers after having served a certain time at the front. The losses sustained in officers commanding the infantry being greatly superior to those in other branches of the army, a call was made on the cavalry to counterbalance this void. Successive drafts were made on this latter arm and amply justified the decree of 4 March 1916 in this respect. Finally, the continuation of hostilities served to provide both professional and amateur officers with a wider experience and resulted in progressively expunging certain natural prejudices existing amongst them, particularly as regards such vexed questions as rights of superior officers and rules governing promotion.

Troops, Armament, Material.— The time is not yet ripe to give precise details regarding the transformations made during the war in the armament and equipment of the troops. Suffice it to say that such transformations are the result of carefully studied plans based on the most up-to-date principles. Open warfare having ceded the place to trench warfare it became imperative to increase in large proportions the output of heavy artillery. To the old light field gun, whose number was daily increasing, new weapons of greater power and range were added. Moreover, trench warfare necessitated a large use of grenades and trench mortars of an approved new design. The unprecedented use of machine guns was also a tremendous factor to be reckoned with in modern warfare. In addition to the foregoing weapons, the quick-firing rifle and bomb-throwing apparatus were invented and had to be manufactured on a large scale, while it should not be forgotten that sapping and mining was carried on daily along the whole of the vast front. These radical modifications of new fighting conditions necessitated a correspondingly radical reorganization of the troops. The two or three machine gun sections per infantry regiment at the commencement of the war were soon transformed into numerous companies. The infantry company itself was obliged to model itself to suit new conditions. Henceforth it was composed of grenadiers (grenade or bomb throwers) and fusiliers (soldiers manipulating the new quick-firing rifles), while the infantryman proper with rifle and bayonet was divided up into the four sections of the company in such a way that each section was composed of two half sections, one of which included the specialists (grenadiers or fusiliers) and the other the ordinary rifleman. The battalion transformed its fourth company into a machine gun company, fighting in ternary order. Certain of the cavalry units were suppressed and among those retained some were formed into foot regiments.

The artillery also underwent no less drastic transformations, the first step being a large increase in the output of guns. Pre-war opinions as to the material and projectile were dissipated almost on the first shot being fired and the French artillery of 1917 possesses a variety of models from the small trench weapon to the latest long range heavy howitzer. The Decree of 18 Oct. 1915 gives authority to the Minister of War to fix, for the duration of hostilities, the number of officers and men forming native colonial troops deemed necessary to be dispatched to France from the colonies of Algeria and Tunisia.

Distinctions and Rewards.—The very existence of the army depending to a great extent on the morale of the fighters, the government used every means in its power to keep it up to the highest possible level. Among the measures adopted, the honorific distinctions conferring a manifest and public proof of the military value of the troops occupied a foremost place. A law promulgated 8 April 1915 provided for the striking of a medal called the «croix de guerre» (war cross) intended to commemorate individual «citations» (mentioned in dispatches) for acts of valor by the army and navy, army corps, brigades and regiments. This cross is in florentine bronze of a diameter of 37 centimeters, of four branches, and between each branch are two crossed swords. In the centre is a head of the Republic. The cross is suspended from a green ribbon with a red border at each edge and with five red bands. This is a replica of the ribbon from which the medal of Saint Helena was suspended which Napoleon bequeathed to his comrades in exile with «*sa dernière pensée.*» The «citations» are distinguished in the following manner: *Army*: palm in bronze in the form of a laurel placed on the ribbon; *Army Corps*: a star in vermeil; *Division*: a star in silver; *Brigade and Regiment*: a star in bronze.

Several «citations» obtained for various deeds of valor are distinguished by as many stars corresponding to their degree, or of palms. By circular of 21 April 1916 a special decoration was created destined to commemorate in a permanent manner the deeds of valor of certain corps mentioned in dispatches. This insignia consists of a plaited «fourragère» with the same colors as the war cross. It forms part of the equipment of the regiment and is worn by all the soldiers of such regiment. They are allowed to wear it even if no longer belonging to the corps, on the understanding, however, that they participated in the action for which the decoration was awarded. The «fourragère» is given to a corps after two army «citations.» A new decoration was instituted in July 1917 for corps mentioned in dispatches four times. This consists of a «fourragère» with the colors of the Military Medal. The same circular stipulated the wearing of stripes or «chevrons» for service at the front. The first stripe (an inverted V worn on the left sleeve) indicates one year's presence at the front, each supplementary stripe six months or more. Stripes worn in the same manner on the right sleeve indicate the number of times wounded— one stripe for each time. Finally, a law dated 27 April 1916 granted diplomas to the families of officers, non-commissioned officers and men killed in action.

COLONEL EYCHÈNE,

Sous-Chef d'Etat-Major du Gouvernement Militaire et des Armées de Paris; Ex-Commandant du 4 ème Zouaves aux Armées; Ex-Instructeur en Chef à l'Ecole Normale Supérieure; Ex Commandant du XII° Groupe Alpin; Officier de la Légion d'Honneur, decoré de la Croix de Guerre, du Mérite distingué d'Angleterre; Commandeur de l'Ordre de Danilo du Montenegro, etc.

25. THE FRENCH NAVY. Brief History.— During the last few years, the French navy has undergone some rather important modifications, both before the war and afterward. In order to make the nature of these transformations clearly understood, it would perhaps not be out of place to give a short résumé of the rôle played by the Navy, at least during the last century, and more particularly since the Franco-Prussian War of 1870. It is admitted that at the conclusion of the American War of Independence the French fleet could be considered as almost equal to the English fleet. Although it did not possess quite as many vessels and frigates, it was better organized than its rival, and its chiefs, officers and men had on several occasions shown their worth. The French Revolution resulted in the disbanding of the General Naval Staff, disorder broke out amongst the men and the material was allowed to deteriorate. The efforts made by Napoleon to regain the ground lost were almost a complete failure. This organizing genius was unable to understand — among other essential things — that squadrons are not formed by mere exercises while at anchor, but that to be able to fight well at sea, it is first of all necessary to know how to navigate without suffering too much damage. After Napoleon, the Restoration period (1814–15), which although it inherited a large number of vessels and small ships in good condition, very nearly lost everything and was on the verge of "liquidating" the entire navy, being unable to understand the importance — for France — of a fleet. The conquest of Algiers (1830) proved, however, that what remained of the French fleet could still be usefully and gloriously employed.

The July government (Louis-Philippe I) sought to reconstitute a navy worthy of France, and was able, during its last years of office, to take advantage of new inventions, i.e., steam, the screw-propeller and steel construction. It was, however, during the reign of Napoleon III, in the 19th century, that the French Navy reached its zenith. The boldness with which its chiefs, aided by a great engineer, Deputy de Lôme, took advantage of the new fields opened up to them through the progress made in artillery and especially in defensive weapons, gave for a time a marked superiority to the French fleet, of which, however, Imperial politics did not take full advantage. It can be stated that from about 1862 to 1868 the armor-plated French squadron had no rival, Great Britain merely following the movement with hesitation and tardiness. Unfortunately this fine fleet had one drawback which made itself seriously felt in 1870 when it became a question of attacking the German coast. Many of the floating batteries of 1855–60 were useless; neither the *Onondaga*, the *Rochambeau** nor the spur-ships of 1864 (of a rather low water displacement) had any weapons capable of opening curved fire. Nearly everything concerning coast warfare — in which connection mines already played an important part — had been neglected. An ineffective blockade was the result. The weakening of France after the Treaty of Frankfort had a serious repercussion on maritime organization. It has, in fact, been stated with reason that the state of this organization gives a precise and exact idea of the power of a nation. Not only the fleet of the Republic definitely lost the first place it had attained for some years in rivalry with the English fleet, but, little by little, it declined to the third rank, then to the fourth, while the German, American, Japanese, Italian, even Austrian, fleets, rapidly sprang into importance.*

For 12 years, however, great efforts were made to recover the ground lost. Programs for naval construction were drawn up, with perhaps more zeal than judgment. It was necessary, moreover, to overcome certain prejudices, technical controversies, deep-rooted differences of doctrine and competitive influences between the various staffs of the Navy. There was a period when the Heads of Corps, of the ships' officers (fleet officers so to speak) were systematically looked upon with suspicion and when the Command might be considered as deprived of its essential prerogatives. This state of affairs, however, gradually improved, but not to such an extent as not to leave serious traces in the organization of the services at the Ministry and in those of the arsenals. At the Ministry, absolute authority was not given to the chief of the General Staff over the directors of the service, resulting in serious difficulties† in the preparation and conduct of war. In the arsenals, autonomy in the management of the works caused continual obstacles to be placed in the executive authority of the maritime prefects, misnamed Commander-in-chief. Moreover, erroneous doctrines penetrated into the governing spheres of the Navy and were embodied in the high technical school training. It was proclaimed that the only thing to be considered was the war of squadrons and big battles fought on the high seas by large units, equipped with a unique weapon, powerful guns with a more and more extended range. The possibilities of a war of cruisers and all questions of an economic order connected therewith, however important in such a vital matter, were disregarded. Coastal warfare did not exist for these new theories of naval warfare on a large scale, and finally, to the amazement of those who knew that France possessed the first submarines, as well as the first seaplanes, submarine and aerial warfare was almost entirely ignored. It was under these conditions — and other nations were in the same predicament — that France faced the formidable conflict of 1914, the immediate lessons of which were to relegate to their proper place so many erroneous ideas. Scarcely a year had elapsed before the large dreadnought fleets took refuge in their protected waters and the sea was patrolled by smaller ships, whilst in its depths submarines slyly navigated, laying mines and ready to discharge torpedoes, these submarines being eagerly sought for by seaplanes.

Composition of the French Fleet.— It is, of course, not permitted to give the *present* composition of the French fleet. We must confine ourselves to stating what it was in July 1914, and what ships were under construction at that time.

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* Bought in 1869 from America and recast in France.

* No mention is made of the Russian fleet as this was weakened by being obliged to split itself up between three maritime stations situated far from each other.

† This point will be taken up again toward the end of the article.

(1) *Ironclad Squadron.*— 25, armored or launched and in course of construction (4 dreadnaughts); 3 dreadnaughts in the stocks and in an advanced stage of construction; 4 in the primary stage of construction. Characteristics of the latter: 25,250 tons; 21 knots; 12 guns of 34 centimeters, 24 of 14 centimeters, 4 of 47 millimeters and 6 torpedo tubes; armor belt plate of 320 millimeters; turbine engines; 1,000 to 2,700 tons of coal.

(2) *Battle Cruisers or Rapid Dreadnoughts.*— Nil.

(3) *Armored Cruisers.*—22 (5 of which are of a very old type and of small displacement, the others varying between 10,000 and 14,000 tons).

(4) *Armored Coast Defense Cruisers.*—3 (one of which is a «gunboat» of 1,800 tons, the two others of 7,000 and 9,000 tons).

(5) *Protected Cruisers or Light Cruisers.*— 10, all old types.

(6) *Destroyers or Torpedo Boats.*— 90, types vary from 310 to 850 tons; characteristics of the latter: 31 knots, turbine engines, 2 guns of 100 millimeters, 4 of 65 millimeters, 4 torpedo tubes.

(7) *Torpedo Boats.*— About 150[*], from 80 to 185 tons, 21 to 30 knots, usually 2 tubes and 2 or 3 light guns.

(8) *Submersible Boats and Submarines.* —53 in service and 18 under construction (plus 6 under study), varying with a marked difference of types from 155 to 215 tons to 833 to 1,100 (*Dupuy de Lôme, Sani, Gustave Zédé,* etc.).

(9) *Auxiliary Boats.*— 1 transport for torpedoes and mines; supplementary naval workshops; 2 mine layers, 2 mine sweepers (4 under construction); 2 petroleum reservoir tenders; 8 transports; 3 gunboats; 3 river boats, etc.

(10) *Steamships Liable to be Requisitioned and Armed.*—About 40 (*La France* 23,700 tons; 24 knots; 7 or 8 guns of 14 centimeters).

Theoretically the warships of the fleet from the ironclads to the submarines ought to have been distributed for eventual disposal both as to personnel and material over various «positions» fixed by the regulations; complete armament, armament for trials; reserve (1st and 2d category); disarmament. As a matter of fact, as regards the material there was a tendency for complete armament, the state of disarmament being nearly always assimilated to that of the ships to be condemned. Concerning the personnel, the Minister himself determines the composition of the men in each particular case and for each of the positions to be taken up by the ship.

Disposition of the Naval Forces.— A fleet composed of two squadrons of ironclads of recent type, one division of armored cruisers and several flotillas of small ships — including a group of submersibles — was maintained, fully armed, in the Mediterranean. A squadron of old-type ironclads, of reduced effectives, and specially used as training ships, formed a solid reserve for this fleet. In the Atlantic and the Channel there only existed a strong division of armored cruisers, comparatively ancient, supported by flotillas of destroyers and submarines.[*] In Morocco a small division consisting of a cruiser and some small boats or transports patroled the coast. In the extreme Orient there was a naval division consisting of an armored cruiser, two or three light cruisers, some river gunboats, a few torpedo boats and some submarines of a small type. The field of action for this division was very extended, covering the whole of the Pacific and the Indian Ocean. Finally, in the different colonies, the Antilles, Senegal, Madagascar, Indo-China, Pacific Settlements, there were small ships fulfilling the rôle of police scouting.

Bases for Operations.—In European waters and northern Africa, the following six maritime ports form the bases for operations: Cherbourg, Brest, Lorient, Rochefort, Toulon and Bizerta (north of Tunis). However, the harbor at Dunkirk, with that of Calais, would also be considered as secondary bases in the North Sea, and especially the first, being splendidly defended both by natural and artificial means (the shoals of Flanders). Bizerta was not quite completed, but was able to render good service which, in fact, it did. In the above mentioned six fortified maritime centres, the supreme command of the entire military organization, under the orders of the Minister of War, was in the hands of the Vice-Admiral Maritime Prefect. This superior officer was of course also responsible for the fixed and mobile maritime organizations (mines, torpedoes, barrages, projectors, torpedo-boats, submarines, etc.). In short, he was, and still is, general director of the arsenal, central headquarters of the maritime bases.

There were four naval bases abroad which were organized for the supplying and protection of divisions of battleships: Fort de France (Martinique); Dakar (Senegal); Diego-Suarez (Madagascar); Saigon (Cochin-China). In addition, Papéati (Tahiti), Haiphong (Tonkin), Libreville (Gabon) and Saint Louis (Senegal) could if required be made use of.

Finally it should be noted that Algiers and Oran, dependencies of Bizerta, possessed, like Bizerta itself, mobile maritime defenses, consisting of small squadrons of torpedo boats. The same remark applies to Ajaccio in Corsica, a dependency of Toulon.

Organization of the Personnel. *(a) Officers.*— Before the war, there were 2,050 naval officers; 340 skilled mechanic officers; 160 naval engineer officers (constructors); 250 naval commissioners; 400 doctors and chemists; 27 hydrographical engineers.[†] Each of these corps was normally recruited from the different schools or by means of special organizations. However, the marine officers' corps, recruited principally from among pupils who have been graduated at the Naval School of Brest, admitted, under certain conditions as regards capacity, pupils from the Polytechnic School, the first mates (masters) of the men composing the fleet, the long distance captains (merchant fleet) having previously passed the position of auxiliary ensign. The different ranks in this marine corps were midshipman

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[*] Most of them dismantled and proposed to be condemned, as well as many other vessels which have, however, rendered great service in the war

[*] A division of reserve cruisers was organized but was far removed from the complete armament.

[†] Besides this there existed 400 reserve officers.

(on training ships only), ensign first and second class (corresponding to lieutenant and second lieutenant in the army), lieutenant (captain in the army), frigate captain (lieutenant-colonel in the army), captain (colonel in the army), rear-admiral (brigadier-general in the army), vice-admiral (general of a division in the army).

During the present war a new rank has been created, that of corvette captain (major in the army), which comes between ensign and frigate captain. Furthermore, the age limit has been lowered for the higher ranks, with a view to rejuvenating the corps. General superior officers are henceforth pensioned off at the age of 62 for vice-admirals and at 60 for rear-admirals.

(*b*) *Men.*— The men serving in the navy are recruited from among the professional sailors and fishermen, all belonging to an old institution called the «Inscription Maritime,» partly by means of voluntary engagements, or in default of this, young men conscripted in the ordinary way for the army are drafted into the navy. The corps are composed of non-professional sailors having no special profession and those having some specialty, the latter being divided up into seven categories corresponding to the various and manifold services of a warship: gabion-sailors and helmsmen, gunners, riflemen, torpedo service, electricians, mechanics and stokers, carpenter-caulkers, quartermasters, store and supply keepers. The military guard and policing of the ship is undertaken by the marine riflemen. They form, moreover, the first element for the *landing companies*. At the commencement of the war they also furnished a naval brigade which so gloriously distinguished itself on the Yser. In the naval war ports there exists a special sedentary marine corps which is in exclusive charge of all matters of a nautical nature at the arsenal and its dependencies (towing, mooring of ships, guard and upkeep of dismantled ships), as well as fire service and the looking after of the fixed defenses.

Each of the corps specialties has its own professional school and its special conditions for promotion. The hierarchy for the different rank is, however, with a few exceptions the same as for all specialties; the duly qualified sailor becomes a quartermaster (corporal in the army), second mate (sergeant), mate (sergeant major) and first mate (adjutant). Finally, there exists a special corps «crew officers» and «principal adjutants» which is employed exclusively in the land services and arsenals. This is an advantageous outlet for specialty sailors who on attaining the rank of mate have been unable to enter the corps for navigating officers but whose practical worth is recognized.

Organization of the Ministry of Marine.— The Ministry of Marine is composed essentially of two principal organizations: High General Staff and Central Administration. The High General Staff is in charge of everything regarding preparation for naval warfare, and in wartime has charge of the carrying out of active operations. This organization has also control over the Officers' Training Schools, at least from the point of view of teaching and methods of training. The Superior School of the Navy, an academy for high naval studies, is more particularly under its direction. The Central Administration is more specially an organization for the study and execution of ministerial decisions concerning the personnel, material, arms, construction, supplies of all nature, general accountancy and the Budget. These various services are split up into two large departments, in charge of vice-admirals, that of the *armed fleet* (personnel and supplies) and *material* (construction and arming); the accounts and the budget being handled more particularly at the Minister's cabinet.

Councils, or large consultative commissions, sit also at the Ministry, as well as the general inspectors of each of the officers' corps. The particular functions of these organizations are to advise the Minister on all questions concerning the proper working of the departments and the strict maintenance of the military or professional aptitude of the officers and men. Finally, the Minister is assisted by a staff of administrative and financial comptrollers, working exclusively under his orders, and responsible for the supervision of the material interests of the department and for the strict application of the regulations laid down to guarantee such interests. When the Minister is a political man, a member of Parliament, new, at any rate at first, to naval matters, it is necessary that, in conformity with his general views, which are really those of the government itself, a naval official should manage effectively the services of the Central Administration and co-ordinate its efforts. The vice-admiral placed at the head of the High General Staff is evidently best suited to be placed in charge, being better acquainted than anyone with the requirements of the naval forces and the means by which this force can best fulfil its duties. But two conditions stand out if full benefit is to be derived from such organization. In the first place it is necessary that the general officer in question possess the personal confidence, one might even say friendship, of the chief of the department. In the second place this official must have full authority over all the directors of the services of the Central Administration. However strange it may appear, it is nevertheless a fact that the problem of which these two conditions form the essential factors has not yet been completely and definitely solved. Moreover, the civil ministers rather resent being kept under what they consider as a sort of guardianship, even temporary. Again, the chiefs of services, especially those of a purely technical nature, have done everything possible to avoid a subordination which affects their personal dignity. This is one of the chief reasons for the comparatively slow progress made in the French Navy during the last 20 years. In addition to this, the credits granted up to about 1908-09 were inadequate, and matters took a false route about the same period as a result of erroneous conceptions concerning naval warfare, as we have explained in the commencement of this section. It is nevertheless true that, thanks to the high qualities of the personnel, the French Navy has rendered to the Allied cause in this war services, the full value of which will be better understood when, after hostilities, they can be freely and openly discussed.

ADMIRAL DEGOUY.

26. FRENCH COLONIES. General History.— Colonization is one of the most characteristic forms of human activity. It was only logical that France, one of the foremost countries imbued with a sense of initiative and enterprise, many of its citizens having a love of adventure, and combining harmoniously in their desire to «live» a prediliction for what is real with a love of the dreamy or ideal side of life, should become a great colonial nation. As a result, once navigators found themselves in possession of the necessary means, they started out to explore the world. In 1365, some Dieppe sailors settled on various parts of the Senegal and Guinea coasts, and in 1404, Jean de Béthencourt, a Norman, settled in the Canary Islands. From 1535 to 1550, Jacques Cartier made a series of voyages and expeditions in Canada. He was succeeded by Champlain who took possession of Acadia. About the same time (1625) Saint Louis du Sénegal was founded and the French settled at Saint Dominica in the Antilles (1632). The colonies of Cape Breton, Canada and Acadia, attacked by the English under the lead of French Huguenots, were restored to France by the Treaty of Saint Germain. From 1664 to 1783 (Treaty of Versailles) the French were very active but had to contend with many vicissitudes and take part in numerous continental wars.

The English, from the moment of the destruction of the Invincible Armada (1588). awoke to a knowledge of their power. The India Company, of London and Plymouth, was founded, Barbados occupied, the enceinte of Madras traced, the Navigation Act passed (1651) and Jamaica conquered (1655). From this time onward, that is, from the middle of the 17th century, English and French colonization made rapid strides, and great rivalry existed between the two countries which often resulted in war followed by the launching of great commercial enterprises. The history of this rivalry can be better understood by an examination of the different treaties arising out of the various conflicts and wars. The treaties of Nimègue and Ryswick were the outcome of the struggle of Holland and France. The latter had Pondicherry restored to her in 1687, where Caron and Martin had done much useful colonization work. In 1713, by the Treaty of Utrecht, France allowed England to destroy the Dunkirk fortifications, a sure sign of its diminished force, and ceded the Hudson Bay and Dependencies, Acadia, Saint Christopher and Newfoundland and adjacent islands, with the exception of Saint Pierre and Miquelon. The Iroquois were recognized as English subjects. In 1748 by the Treaty of Aix-la-Chapelle, Cape Breton was restored to France in exchange for Madras. The Treaty of Godeheu in 1754 was an evidence of the withdrawal of the India Company and its object was the restoration of the territory conquered by the French in Deccan. Meanwhile Mauritius was occupied and New Orleans founded as a result of the brilliant campaigns of Cavelier de la Salle in Louisiana. Dumas, la Bourdonnais and Dupleix, by armed force and clever diplomacy—which must always work together — brought French influence and power to its zenith in the Indian Ocean (1752). Vain efforts. A weaker power vanquished by a superior one. Quebec was lost. Clive and Coote took Pondicherry and Chandernagor. The Treaty of Paris (1763) severely condemned these set-backs. Canada was turned over to England by France, thus losing all the fruit of the heroism displayed by Montcalm and his lieutenants. Ohio, Louisiana to the east of the Mississippi, except New Orleans, was given to Spain in compensation for Florida and Senegal, except Gorée, Saint Vincent, Dominica, Tobago, Granada and the Granadian isles.

On the other hand, France recovered her Indian establishments, but dismantled and without territory, Saint Pierre and Miquelon, Belle-Ile in compensation for Minorca, Guadeloupe, Martinique and Saint Lucie. The Treaty of Versailles (1783) restored Senegal to France. The English colonies now became emancipated. We have now reached the period of the Great Revolution, followed by the magnificent campaigns of the empire and the fall of Napoleon. For a while, France was all powerful and the emperor could be pardoned if he conceived a wonderful plan: that of taking India from the English and the conquest of Asia. But this dream met the fate of all similar schemes which, overriding the reasonable bounds of human desires, seek to dominate the world. It came to an end in the icy steppes of Russia. The Congress of Vienna in 1815 resulted in consecrating English power which was increased by the possession of Heligoland, Malta, the Ionian Isles, Cape Colony, taken from Holland, Mauritius, Saint Lucie and Tobago. The colonial situation of France in 1815 was the following: she had lost a large part of her empire. Saint Dominica was torn from her in 1803. Louisiana was sold. She retained Martinique, Guadeloupe, Cayenne, Saint Pierre and Miquelon, a part of Senegal, the Reunion and a few markets in India, all that remained of the immense domain controlled by the India Company, which in Dupleix's time possessed 17 boats, 25 frigates and 750 vessels of various types. During the 19th century new efforts were made for the conquest of distant territory: Caillé Sylvain, Roux and Gourbeyre explored Africa. Algeria was conquered under Louis Philippe, in despite of the colonial entente. The Marquesas, Tahiti, Wallis Islands and Gambier were occupied (1841–47). The second empire witnessed the development of French West Africa: war with the Moors, expansion in Guinea, on the Ivory Coast, in Dahomey and the Gaboon. Treaties were made in Madagascar. Cochin-China was occupied, agreements were reached with Cambodja and Siam; Mékong and the Tonkin were explored. Finally, New Caledonia was conquered and Tahiti organized.

After the tragic events of 1870–71, the Third Republic resumed the work of expansion, thus proving that France possessed remarkable vitality. Protectorate of Tunisia, progressive occupation of Senegal, of the Soudan, of the Niger and of the Guinea coast, of Kongo and Tchad, such were the new possessions to be added to France. The Somali coast became French at the very time when the Italian campaign failed at Adua. Madagascar was occupied in 1895. Indo-China was conquered from Chantaboun to Hainan. The appalling conflict of 1914 breaks out. The French Colonial troops occupy the greater part of the Cameroons and the half of Togoland in co-operation with their British allies.

This brief historical sketch shows the importance of the colonization work carried out by France since the 16th century. Comment is almost superfluous. It would, however, be inexact and imprudent to consider the successive conquests of France as a natural evolution of its expansion or as having been accomplished without trouble and difficulty. A famous French economist, Christian Schéfer, in his remarkable work 'La France moderne et le problème colonial' endeavors to show, and not without success, "how the recent ardour for distant campaigns was not the result of a mere whim nor merely of circumstances; to show, in fact, how the enterprises successfully carried out in the Second Empire and Third Republic were in many cases only the realization of long and carefully studied schemes, how, in a word, despite the revolutions which break up our history, racial traditions have been maintained, and it is owing to such traditions that opposing governments have collaborated in a fraternal spirit in a common task."

In this conception there is an optimism which undoubtedly will tend to assure the main lines of a very remarkable doctrine, but an examination of the historical facts render some modifications necessary. The truth is that in France, the colonial effort has from all time encountered a few zealous disciples, but often too stubborn opponents. At the very time when a Henri IV, or a Richelieu, foresaw that the future of the country depended on the exploitation of distant possessions of countless wealth, at the moment when pioneers dreamed of a mythical and fabulous Eldorado — a false conception perhaps but an excellent incentive to activity nevertheless — Colbert elaborates a Colonial Pact and draws a conception of the economical relations of the colonies and the motherland which still greatly hinders the development of the French possessions. This conception was too narrow and lost sight of the great evolutions to be realized in the centuries to come. Following this we have the deplorable events of Louis XVth's reign resulting in the great work accomplished by Martin and Dupleix being thwarted and reduced to nothing by a spiritual and sceptical king, by incompetent officials and all kinds of underhand intrigues and dishonest practices which brought about the ruin of the India Company at the very time when Montcalm, inadquately protected against the prevaricator Bigot, and left to his fate in Canada, appeals vainly for support from his king and country. After the Seven Years' War we lost North America and Hindustan. We still possessed Louisiana but Napoleon I was shortly to sell it. After Voltaire's vaunting in his letter to Chardon regarding the cession of Canada's "acres of snow," Bernardin of Saint Pierre declared, "I shall be convinced that I have rendered service to my country if I prevent a single man from leaving the country and if I can persuade him to cultivate an acre of neglected land at home." On 13 May 1791, Robespierre, finely emulating Rousseau, said "Let the Colonies perish, if they mean the loss of your welfare, your glory, your liberty! Perish the Colonies, if colonists are to make us, by threats, decree laws for their own especial benefit!"

On the other hand, Barrère, on 21 Sept. 1793, did not hesitate to write that "without a fleet you can possess no colonies, and without colonies there can be no commercial prosperity." The Convention period, as regards colonial régime, made a highly important resolution by decreeing the complete assimilation of the colonies and the mother country. Article 6 of chapter I of the Decree of Year III states: "The Colonies form an integral part of the Republic and are subject to the same constitutional laws. They are divided into Departments." The Directoire government was hostile to over-sea expansion. Delacroix, Minister of Foreign Affairs, clearly stated: "I would much prefer that France possessed four more villages on the frontiers of the Republic than the richest of the Antille Islands and I should even be sorry to see Pondicherry or Chandernagor again belong to France." However, it should be borne in mind that about the same time, Talleyrand read to the Institute on the 25th Messidor, Year V, his paper concerning the advantages to be gained by the possession of new colonies in the present circumstances.

Bonaparte appeared, at first, to be the man who would favor colonization on a large scale. On this subject, Mr. Paul Gaffarel* has written: "The ephemeral conquest of Egypt and Syria, the taking of the Ionian Islands, the occupation of Louisiana, and the Saint Dominica campaign, indicate that one of France's great ambitions was to increase and develop its maritime and colonial policy. However, during the last years of the Consulate and particularly when he became emperor, Napoleon had only disgust for the fleet; for him colonies were a negligible quantity and he lost several opportunities of re-establishing our over-sea prestige."

The dogma founded on assimilation was brought to nought: article 91 of the Constitution of Year VII decreed that "the colonial régime shall be determined by special laws." Decrees of the 19 April and 16 June 1902 reorganized the old régime as regards Guadeloupe and it is expressly stated "the colonies shall be governed by the laws in force before the Revolution." This erroneous colonial conception had its repercussion throughout the country: "Paralyzed and rivetted to the Continent by its very victories, France no longer has any interest in her Colonies." With the Restoration, it was seriously thought of abandoning them. In 1817, the Budget Commission, through its official Count Roy, requested a reduction to 44,000,000 francs in the Marine and Colonial Budget, which in 1786 had amounted to 66,000,000, and, moreover, he was successful in his petition.

In 1822 and 1828 General Foy and General Sébastiani once more attacked the colonial situation. In 1829, Deputy Bessières again states that "for what the colonies are worth and cost us, we should be much better off if we did not possess them. A colonial system, even if advantageous, is no longer practicable. I maintain that it has ceased to be necessary." However, the Restoration government did not abandon all its colonies: the famous “Ordonnances” are proof of this and the Algiers campaign was the signal for French Colonial Renaissance (1830). But, under Louis-Philippe, as with Napoleon III and the Third Republic each time that, activated by a sort of instinctive fatalism, France proceeded to new colonial conquests, the same opposition was encountered, supported by the same weak arguments which had prevailed in Colbert's Colonial Pact. After more than 100 years had elapsed, the excessive conceptions of the Revolution were found again in the minds of certain militant socialists who persisted in seeing in the colonial policy merely an occasion for the exploitation of distant peoples, and refused to recognize the indispensable rôle which colonies play in the economical evolution of a great country like France. The few facts we have indicated — to which could be added many more of no less a significative character — sufficiently prove that France's colonial policy has always encountered difficulties and that, at all times in its history, it has had to overcome the strongest hostility. But the war which is scourging Europe and which has caused so many bereavements and so much ruin will at least result in making all Frenchmen perceive the necessity for closely following all colonial matters and reaping that harvest from their over-sea possessions which they should legitimately expect. As a matter of fact, while not pretending to be versed in witchcraft, it would truly seem that France, much more so than ferocious Germany, had received a high mission from Civilization to fulfil, which it had always carried out to its honor despite every difficulty encountered. Fortunately men of energy have always been found in France at the critical moment ready to defend and maintain those principles which a weak-kneed government failed, or seemed disinclined, to uphold. Looked at from this point of view, French colonization appears as a kind of mission above the level of French people's desires, and beyond the hesitating will of its leaders; it is undoubtedly an admirable mission which, even during its most sombre history, has always found a champion to fight for its cause, either among the professional politicians or from among the people in distant lands, ever ready to set the example, to “militate” and to sacrifice himself. In the 18th century, it was Montcalm who wished to keep Canada, despite Louis XV. In the 19th century it was, as regards Africa, the Bingers and the Marchands, the Gentils and the de Brazzas who, supported in the mother country by noble-minded and intelligent men, enriched France by assuring it vast territories and large spheres of influence. As compensation for the action of governments who have not always drawn up with sufficient care the principles of a colonial policy based on practical observation and solid doctrines, we find disinterested and noble individuals whose one desire is to make France richer and greater, and to renovate it continually by fresh additions of lands and peoples. The events of the World War, the precious and generous aid given by the colonies to the mother country prove in a striking manner the debt which every Frenchman owes his colonies. This individual character of colonial work does, moreover, great honor to the French race. Certain people discussing the episodes of the battle of the Marne and the heroic resistance at Verdun have dared to speak of a miracle. It is sheer blasphemy to pretend that the results obtained are to be attributed to some vague occult, and more or less divine protection. The truth is that throughout their history the French of to-day, as in the past, owe their success to their magnificent and sublime individual qualities which makes up for absence of direction just as it does for lack of preparation and the incoherence of methods.

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* Paul Gaffarel, 'La Politique Coloniale en France de 1789 à 1830.'

TABLE OF THE GENERAL SITUATION OF THE FRENCH COLONIES.

TRADE STATISTICS FOR YEAR 1913

(Last normal year)

COLONIES	Area in square miles	Population	Importations	Exportations	Total
			Francs*	Francs*	Francs*
A. NORTH AFRICA					
I. Algeria	343,500	5,492,569	729,111,000	562,917,000	1,292,028,000
II. Tunisia	50,193	1,850,000	144,254,678	178,663,360	322,918,038
III. Morocco	231,660	4,550,000	149,774,979	30,865,639	180,640,618
B. AFRICAN COLONIES					
I. French West Africa	1,544,400	9,811,849	151,574,300	126,143,852	277,718,152
II. French Equatorial Africa	849,420	6,137,000	21,181,768	36,865,938	57,846,805
III. Madagascar	225,868	2,701,081	46,747,456	56,054,377	102,801,833
IV. Reunion	965	177,677	24,934,943	16,592,290	41,527,237
V. French Somaliland	46,332	208,061	33,916,843	47,704,148	81,620,991
C. ASIATIC COLONIES					
I. French Indian Establishments	198	277,723	10,837,115	43,720,095	54,557,210
II. French Indo-China	310,059	16,315,063	306,238,068	345,259,253	651,697,321
D. AMERICAN COLONIES					
I. Saint Pierre and Miquelon	92	6,483	4,356,745	6,201,998	10,558,543
II. Guadeloupe	686	190,275	20,174,930	18,287,489	38,462,419
III. Martinique	382	182,024	22,144,315	28,896,814	51,041,129
IV. French Guiana	30,980	39,117	12,494,765	12,222,537	24,717,302
E. OCEANIC COLONIES					
I. New Caledonia	7,201	55,886	17,707,916	15,838,405	33,546,321
II. French Oceanic Estabmts	1,182	30,563	9,030,474	11,554,507	20,584,981
	....	....	1,704,530,495	1,360,916,248	3,243,067,096

* Franc—$0.19 United States currency.

In an excellent work entitled ‘Un demi-siècle de civilization française 1870–1915,’ Mr. Raphael Georges Levy rightly states that “France has founded a colonial empire which is second only to that of Great Britain. Over the entire length of its African and Asiatic possessions, Justice reigns: France has *civilized* in the noblest sense of the word.”

M. Marcel Dubois, a Sorbonne professor, in his book ‘Systèmes coloniaux et peuples colonisateurs,’ protests with vehemence against the common belief that the French do not possess a genius for colonizing and that France has no need of colonies. “These opinions,” he says, “which until quite recently have paralyzed our colonial activities, are the sequence of discussions commenced in the 18th century, following the general tendencies of that period, on the questions of deciding, *in abstracto*, whether or not we should colonize and how we should colonize.” He concludes: “The lessons taught by our colonial history should be particularly borne in mind, for, of all the great colonizing countries, France is the one whose temperament has been least changed and whose traditions are, therefore, the most instructive. Our example has served as a guide to other nations; our experience has generously served humanity at large.” This conclusion merits our unreserved approval as it constitutes the finest eulogy of France's colonial effort.

CARL SIGER,
Colonial Editor of the ‘Mercure de France.’

27. FRANCE, DIPLOMATIC RELATIONS OF THE UNITED STATES WITH. Before 1763, France had plans of occupation which “held North America by its two ends” and threatened to restrict the English colonists in America who actively participated in the struggle for the Ohio Valley and for Canada. In 1763, when France relinquished the Ohio Northwest and Canada to England and Louisiana to Spain, French leaders foresaw the revolt of the English colonies and recognized French interest to promote their independence.

American success in the Revolution was largely due to French aid. The result was largely influenced by the sympathy of the French people expressed both in outward acts of individuals and of the French government to which the Continental Congress first directed its diplomatic efforts to obtain recognition in the family of nations. In the first year of the war, French secret aid was sent to keep the struggle alive; and, after American success at Saratoga, negotiations with France through Franklin resulted (6 Feb. 1778) in a treaty of amity and commerce and a treaty of alliance. By the latter the United States, in order to secure French aid, guaranteed the possessions of France in America and agreed to receive her prizes in American ports. These treaties, due largely to the French desire to avenge her late humiliations by England, were of momentous consequence in determining American independence. Later, in April 1781, when Washington, viewing the critical state of affairs, urged that France must act quickly for American deliverance, the formidable squadron (28 ships) of Admiral de Grasse set sail from the West Indies for Hampton Roads, promptly brought invincible deliverance from the tenacious Cornwallis, and placed the United States under a debt of gratitude which, never forgotten, was partially repaid over a century and a third later by large American armies dispatched to France to push back the long premeditated German invasion of French territory. In the peace negotiations of 1782, however, France was inclined to favor the Spanish proposal to limit the United States on the west to the Appalachians.

In July 1784, Franklin negotiated with France a consular convention which proved unacceptable because it did not follow instructions based on the plan adopted by Congress in January 1782. On 14 Nov. 1788 Jefferson signed a new consular convention which, adhering to the plan of Congress and receiving the unanimous consent of the Senate, was made effective by act of Congress on 14 April 1792.

Meantime the French government unsuccessfully attempted by decrees to prevent the tendency of American commerce to revert to its old channels — a tendency which had produced dissatisfaction in France. Late in 1790 it also complained that certain acts of the American Congress in regard to duties were an infraction of the treaty of 1778, and soon proceeded to adopt measures of retaliation. In 1792, following instructions of Secretary Jefferson who desired to secure a new commercial convention, Gouverneur Morris, appointed Minister to France, began negotiations which were quickly and radically changed by new revolutionary proceedings.

The American people hailed with enthusiasm the outbreak of the French Revolution but by 1793 there was a strong reaction led by the more conservative element and influenced by the increasing violence of the Revolution and the Genet incident, and marked by the President's firm stand on neutrality. At the opening of the war between France and England in 1793, Franco-American relations became involved by embarrassing controversies and discussions concerning the construction and enforcement of the old treaties. For her aid in the American Revolution, France made demands on the United States which threatened to embroil the new republic in a ruinous war with Europe. Under the treaty of 1778, she claimed the right to take prizes into American ports and under the consular convention of 1788 claimed a jurisdiction for her consuls which was very embarrassing to a neutral. The American government denied these claims, asserting that, by the circumstances of the war, it was released from its treaty obligations.

In the interest of national salvation, Washington in a proclamation of 22 April 1793 declared a policy of neutrality for which the American government struggled for 20 years to secure proper respect. Genet, who arrived at Charleston in June 1793 to use American territory as a base of operations to recover Louisiana territory which France had ceded to Spain in 1762, impertinently claimed privileges even beyond those granted by treaty. In defiance of Washington's proclamation of neutrality, he proceeded to fit out French privateers in American ports with a demand that they should be permitted to return with captures free of duty and to sell them. The American government objected, demanded the return of British prizes seized in American waters and maintained that American courts instead of French consular courts should determine whether captures had been made in American waters. In August 1793, it requested the recall of the offensive Genet. Meantime, in May 1793, the French National Convention threatened American commerce by directing the capture of vessels carrying provisions and merchandise belonging to the enemy or bound for the enemy's port. Later it placed an embargo on American vessels at Bordeaux and captured American ships and goods. At the same time, in opposition to rules asserted by England, it opened to neutral vessels a lucrative trade with the French West Indies which had been closed to foreign vessels before the beginning of the war with England.

Meantime, Gouverneur Morris had been unacceptable to the Revolutionary party, and on request of the French executive council was recalled in May 1794 by President Washington. His successor, James Monroe, was promptly appointed to protest against illegal seizures and violations of treaties by France, to remove French suspicions concerning the Jay mission and seek French aid in obtaining from Spain the free navigation of the Mississippi. To him, although he was cordially received, the French Directory complained that the American government was violating both the treaty of 1778, and the consular convention of 1788 and was discriminating against France by a clause of the Jay treaty relating to contraband. After his recall, and the recall of Adet from Philadelphia (leaving no French Minister in the United States until 1800), the Directory refused to recognize or receive an American Minister until the American government should make reparation for its acts and proceeded to issue new decrees (of 4 Jan. 1795, 2 July 1796 and 2 March 1797 and 18 Jan. 1798) prefiguring the later Berlin and Milan decrees and aiming at the destruction of American commerce. C. C. Pinckney, who had been appointed to succeed Monroe, was compelled to retire to Amsterdam and in the fall of 1797 returned to Paris with John Marshall and Elbridge Gerry, whom President Adams had appointed to join him in the French mission. These commissioners were unable to open direct negotiations with Talleyrand, who resorted to preliminary clandestine communication through secret agents demanding a national loan and individual bribes. Later (18 March 1798) Talleyrand was disposed to treat with Gerry alone who, although he remained after the departure of his colleagues, declined to accept the invitation to enter into formal negotiations.

The return of Marshall and Gerry with the news of their treatment caused Congress to suspend commercial intercourse with France and her dependencies, to make preparations for war (28 May and 22 June) and to declare (7 July) the abrogation of treaties with France, resulting in actual hostilities at sea in several instances, but George Logan of Philadelphia who, with no passport except letters of introduction from Jefferson and Governor McKean, undertook a self-constituted mission to Paris and returned with verbal assurances that France was ready to treat on a proper basis.

Later assurances made to William Vans Murray, American Minister at The Hague, that France desired to treat through a suitable envoy, resulted in the appointment by President Adams (without consultation of his Cabinet) of a new temporary commission — Murray, Judge Oliver Ellsworth (of Connecticut) and Gov. W. R. Davie (of North Carolina), with instructions to assume that previous treaties of France had been revoked by Congress, to demand spoliation indemnity for damages inflicted on American commerce before 7 July 1798 (the date of the abrogation of the treaties by Congress), and to make a treaty (for not more than 12 years) free from the previous provisions as to guaranty, alliance and consular judicial jurisdiction, and establishing a claims commission. Then followed a series of tedious negotiations with the First Consul, who insisted that previous treaties were still in force and offered the alternative of acknowledgment of abrogation of treaties and no indemnity or continuance of treaties with claim for indemnity. The American commission finally abandoned instructions by sacrificing the French spoliation claims but secured a temporary convention (of 30 Sept. 1800) which (after amendment by the Senate and Napoleon) released the United States from the treaty obligations of 1778 and France from responsibility for all damages.

This peaceful adjustment of serious difficulties delivered the United States from the perils of war, and three years later made possible the peaceful acquisition of Louisiana from France by the negotiations of Livingston and Monroe — an achievement which constituting a new historical tie of friendship between the two nations concerned, opened the road for westward expansion and prevented a long struggle of the United States for supremacy in the Southwest against a strong rival nationality which threatened to erect a barrier to American destiny.

The Louisiana treaty was followed by diplomatic correspondence relating to the disputed boundaries of the territory acquired and later by efforts to get the co-operation of France in the negotiations with Spain,— until the later decrees of Napoleon and reprisals on neutral commerce, opposed by the vigorous but unsuccessful protests of General Armstrong, the American Minister at Paris, gave a new turn to diplomatic relations.

Against the Berlin and Milan decrees of Napoleon which subjected to seizure every American vessel bound for ports of Great Britain or her colonies, American diplomatic representations were unavailing; and the sacrificial embargo was doomed to disappointment. Protests against the later Rambouillet decree of March 1809 were equally unsuccessful. Finally, after the passage of the American Non-Intercourse Act, Napoleon, in order to increase American activity against England, promised that his decrees would cease and induced the American government to issue a proclamation (of 2 Nov. 1810) to restore intercourse with France, but he continued to seize American vessels under various pretexts.

For a quarter century after Napoleon's overthrow and the restoration of the Bourbons, Franco-American relations were comparatively unimportant. The chief questions arising for discussion were commerce, spoliation claims, the American acquisition of Florida from Spain, the French measures against liberal government in Spain, followed by the declaration of the Monroe Doctrine and policy relating to the destiny of Cuba.

The American government endeavored to

secure from France a commercial convention which, on the basis of the Anglo-American commercial treaty of 1815, would place American vessels on an equality with the French in carrying American products to France, but the French government which, by an extra duty on cotton imported in American ships, had greatly increased the tonnage of French vessels engaged in the trans-Atlantic trade, was not anxious to surrender these benefits. Finally, after Congress passed a law imposing a tonnage tax upon French vessels, thereby depriving them of their immense advantages and profit, France speedily agreed to a convention providing for the equal interchange of products in the ships of both countries — an arrangement which immediately increased the American tonnage employed in the French trade. An obstacle to the adjustment of difficulties arose from the interpretation of the eighth article of the Louisiana treaty which provided that after the expiration of 12 years the ships of France were to be treated upon the same footing of those of the "most favored nation." After long argument the matter was adjusted by a treaty of 24 June 1822.

Apparently in 1823 the French government hoped to expand in the West Indies and regarded the American recognition of the independence of Latin-American states as an attempt to arrest French development. The United States was especially anxious in regard to the destiny of Cuba and in regard to European designs in connection therewith. After France, in 1825, refused to accept the British proposal to bind herself not to seek the acquisition of Cuba, the American government informed the French government that it would not permit France the occupation of either Cuba or Porto Rico either with or without the consent of Spain.

The most important diplomatic question remaining for adjustment with France was the tiresome wrangle concerning the French Spoliation claims. These claims for injury to American commerce after 1803, especially by the Berlin decrees and subsequent decrees of Napoleon, which had been awaiting the establishment of a more stable government in France, began to be pressed by Secretary Adams in 1819. At the same time France claimed damages for alleged violation of the "favored nation" clause of the treaty of 1803. On these subjects Adams and DeNeuville could reach no agreement. Although in 1822 they negotiated a convention of navigation and commerce greatly reducing discriminating duties, yet the spoliation claims and the "favored nation" clause both remained unsettled until by the Rives-Sebastiani treaty of 4 July 1831, France agreed to pay 25,000,000 francs ($5,000,000) for American claims and abandoned French claims under the old favored-nation clause, and the United States agreed to pay 1,500,000 francs ($300,000) in satisfaction of certain French claims. The delays of the French Chamber of Deputies, and the refusal in April 1834 to appropriate the money necessary to pay the claims, resulted in 1836 in the recall of Mr. Livingston from Paris, followed by the recall of Pageot from Washington. Although diplomatic relations were suspended for over a year, the French government, partly through the mediation of Great Britain, soon took steps toward their restoration by providing for the payment of its obligations.

A few years later, new treaties were subjects of correspondence. In 1841, Lewis Cass, the American Minister at Paris, protested against the Quintuple treaty (to which the United States refused to become a party) on the ground that its object was to show the American government in a bad light. A treaty of extradition was signed 9 Nov. 1843. A consular convention concluded 10 years later (23 Feb. 1853) contained a provision (protecting consuls against compulsory appearance as witnesses before the courts), the violation of which in 1854 at San Francisco was the occasion of a serious complication which, however, was happily adjusted.

Meantime relations in Central America, in the Pacific and in the West Indies became subjects of discussion. It appears that France was expected to join in the guaranty established by the treaty of 1846 for the transit route across the Isthmus of Panama and by the Clayton-Bulwer Treaty of 1850 for the canal across Central America. In 1851, on invitation of the Dominican Republic, the American government sent a special agent to co-operate with representatives of France and England in a remonstrance to stop the Haytian war against San Domingo and with a view to possible joint intervention if needed, but in 1852 it declined to accede to the proposed tripartite arrangement for guaranty of Cuba to Spain. The Hawaiian Islands, valuable because of their harbor facilities in connection with the development of trade interests in the Pacific, were a source of contention between France and the United States for nearly two decades. In 1843, following the French seizure of the Marquesis Islands, and the demands of France on the Hawaiian authorities, the American government made a declaration against any attempt by any power to take possession of the Hawaiian Islands either by conquest or by colonization. This declaration doubtless influenced both France and England to recognize Hawaiian independence in 1845 and to agree never to take possession even under a protectorate. In 1849–50, following a punitive blockade of the Hawaiian harbor by a French frigate, the American government renewed its declaration in stronger terms and contemplated joint action with England to prevent French occupation. France, checked in her plans, finally withdrew her extravagant demands and disclaimed any intention of improper interference, but continued jealously watchful of increasing American influence which in 1854 finally found expression in a draft treaty of annexation — a treaty whose execution was prevented partly as a result of French protests.

After 1852 the United States was apprehensive of French policy under Napoleon III. American diplomatic correspondence from the accession of Napoleon III to the throne of France until the opening of the Civil War shows increasing apprehension of French diplomacy in Spanish-America, and especially in Mexico which, beginning with French designs in the mining region of Sonora in 1852, seemed to contemplate a European protectorate. It also shows apprehension of concerted action of France and England in a policy relating to Cuba and in the political adjustment of the Americas.

Franco-American relations during the American Civil War, often severely strained, were largely determined by Napoleon's policy in Mexico. They were particularly affected by the determined and persistent watchfulness and firm determination of the American government to prevent the European recognition of the Confederate insurgents, or European intervention in American domestic concerns through the concerted action of European powers under the influence of Napoleon, and by the continued expression of admonishing opposition to Napoleon's Mexican expedition which (in spite of his friendly assurances) was regarded as a deliberate attempt to establish a Latin-American barrier in order to restrict the dominating influence of the United States on the continent. After the establishment of the Franco-Maximilian empire which was regarded as a blow at the Monroe Doctrine and whose immediate bearing upon the future politics of the American continent became a subject of much speculation and concern, relations were affected by the American apprehension of possible plans for a Franco-Confederate alliance as a counterpoise to the strength of the United States, and as a strategic step in the extension of French dominion southward from Mexico to the gate of the isthmus. After the failure of the Confederate attempt to destroy the integrity of the Union, American diplomacy successfully centred its efforts on urging the withdrawal of French troops by which Maximilian had been sustained.

During the Franco-Prussian War of 1870 American diplomatic relations at Paris assumed a position of unusual prominence. The American Minister while maintaining friendly relations with the French rendered important services to foreign residents of Paris and to the Prussian government.

Among the subjects affecting diplomatic relations after 1870, the most important, aside from questions incident to immigration, naturalization and citizenship, were the formation (in 1881) of the French company for the construction of the canal across the Isthmus of Panama (over which the United States had guaranteed neutrality of transit by treaty with New Grenada in 1846), and French restrictions on the importation of American pork products after 1880 on alleged sanitary grounds.

In 1884–85 when the French canal company began work on the canal the American government insisted that the United States would exercise her right to take all needful precautions against the possibility of offensive use of the isthmian transit against American interests on land or sea. In 1884, acting on a report that Hayti contemplated a cession of naval bases to France, the American government promptly instructed its Minister at Paris to state that such acquisition would conflict with the Monroe Doctrine. In 1888, while discrediting the rumor of French plans to declare a protectorate over Hayti or to annex it, Secretary Bayard, in view of the possibility that the French government might be asked to complete the Panama Canal, instructed the American Minister again to take opportunity by explicit language to express the consistent American policy to leave the smaller independent republics of Latin-America free to develop their own resources, free from foreign dictation or interference.

The French act of exclusion of American pork, resulting in threats to prohibit the importation of French wines, was a theme of continuous diplomatic correspondence until its repeal was secured in 1891. The situation was complicated by the McKinley administrative bill which by a tariff on French wine attempted to accomplish indirectly what the French prohibition of American pork accomplished directly. Finally, after Congress enacted legislation providing for thorough inspection of all meats intended for exportation, a repeal of the French restriction was obtained through Whitelaw Reid, the American Minister to France.

In the decade after 1882, French colonial expansion in Africa was a subject of American diplomatic correspondence. In 1884, the American government, through Secretary Frelinghuysen, warned France again aggressions on Liberia. Again in 1892–93 it interposed its remonstrances against the danger of French spoliation of the weak republic.

Meantime a claims convention with France, concluded in 1880, was supplemented by conventions of 1882 and 1883. By the convention of 1880 a board or mixed commission was created to adjust the claims resulting from the American Civil War, the Mexican troubles of 1863–67 and the Franco-German War. It sat at Washington 1880–84 and completed its work in 1884, awarding $612,000 to France. A reciprocity arrangement of 28 May 1898 was followed by the negotiation of a reciprocity convention (of 24 July 1899) which, however, was not ratified. The arrangement of 1898 was amended and supplemented on 20 Aug. 1902.

Although French sympathy for Spain early in the Spanish-American War was noticeable, the French government was irreproachable in its conduct and the French Minister at Washington tactfully performed the delicate task of opening negotiations for peace. Subsequent signs of illwill caused by the American policy in the Far East — especially by the American opposition to the designs of Russia which had been an ally of France — were soon succeeded by a better understanding shown in the French appreciation of President Roosevelt's initiative in the peace negotiations following the Russo-Japanese War, and the friendly attitude of the Washington government during the Morocco dispute. With the elimination of the last real danger from conflicting interests by the American purchase of the property of the bankrupt French Panama Canal Company, Franco-American relations were placed on a more satisfactory basis than they had been for a century. The Monroe Doctrine, which has sometimes been opposed by French writers through misapprehension that its extension will result in American aggression against the French West India Islands, recently has been regarded more as a safeguard against the transfer of her West India colonial territory to any other European power seeking colonies at French expense.

An arbitrary convention, suggested by The Hague Convention of 1899, was concluded in 1907. A more comprehensive arbitration treaty was signed on 2 Aug. 1911, but was emasculated by the Senate March 1912 and finally abandoned. A general treaty of arbitration to facilitate the settlement of disputes and to further the advancement of the cause of general peace was negotiated in September 1914 and proclaimed in January 1915.

In the World War, begun by the invasion of France by Germany, the American government at first maintained a strict neutrality, but, finally, instigated by brutal German attacks upon American rights on the sea, decided to co-operate with France and England in a determined effort to arrest the German menace to the peace and civilization of the world. Although the United States has not been directly affected by French political institutions, and until recently has not been bound to France by close ties in foreign affairs, Americans have been greatly influenced by French thought and cannot remain indifferent to what happens to France.

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FRANCE, The Bank of. Before the Bank of France was established all attempts which had been made to create a fiduciary circulation had ended in ruinous failures. The last and most disastrous experience had been the creation of *assignats* in 1789 by the Assemblée Constituante. The assignats were government currency notes issued on the security of the Biens Nationaux (estates of the clergy), pending the sale of the latter. The assignats were to be canceled when returning to the coffers of the treasury; in fact they were left in circulation, multiplied without any control, until one day their value was measured only by their weight of paper. When that financial catastrophe occurred the disasters that attended Law's plans (under the reign of Louis XV in 1716), were still alive in the minds of the people. It is, therefore, easy to understand that the very name of banking was discredited when, in 1800, Bonaparte, being at that time First Consul, decided to establish a great issuing bank to serve the interests of the state and of trade as well. A company was created under the name of *Banque de France* just as an ordinary joint-stock company with an original capital of 30,000,000 francs. The capital was increased to 45,000,000 francs in 1803, when the bank first began to enjoy the exclusive privilege of issuing national bank notes; then to 91,000,000 francs in 1848 and finally to 182,500,000 francs in 1857. The capital has not been increased since that time. The shares are of a nominal value of 1,000 francs and they were quoted on the Paris Bourse at over 5,000 francs (in January 1917).

Although all the shares are nominative (the French capitalists having a marked preference for bear shares and bonds), and in spite of the fact that their price increases in a constant and steady manner, the shareholders have never ceased to grow in number. For the same amount of shares there were in 1860, 13,767 holders; in 1880, 27,136 holders; in 1909, 31,249 holders; in 1915, 33,453 holders.

In order to understand how popular are these shares with the general public it must be kept in mind that one-third of the holders do not possess more than one share each and that 50 per cent have no more than two shares each. The Bank of France was given a charter at first for only 15 years. Before that period expired, the privilege was renewed for another period of 25 years and has always been renewed before expiration. The last renewal of the charter was granted by the state in 1897; it is to expire on 31 Dec. 1920, but it will of course be prolonged for another period.

Internal Organization.—At the beginning the bank was governed by 200 of the largest shareholders (each of them having only one vote), who elected the *Conseil Général,* that is to say, the board of directors entrusted with the management. This Conseil Général consisted of 18 members, 15 of them being *régents* (directors) and the three other *Censeurs* (supervisors). A committee of three *régents* was then selected by the Conseil Général to act as managing directors. In 1806 Napoleon (he had then become emperor), decided that the real management of the bank should be invested in a nominee of the government. He accordingly selected the three members forming the Committee of Managing Directors, that is to say, the governor and the two deputy-governors. That organization has lasted till to-day. The governor and the two deputy-governors are always appointed by the government. The latter is also a national bank, inasmuch as it has no branch whatever in foreign countries, not even in the French colonies which have their own and independent banks of issue. At the beginning it was to be only a Parisian bank, but the area of its operations was by degrees extended to the whole of France where there are now 143 *succursales* (branches) in the principal towns. Besides, 75 sub-offices (*bureaux auxiliaires*) have been established in minor centres, whilst in 365 other localities (*villes rattachées*), selected among the most important, all drafts and bills, payable in these localities, are collected by the bank at par. (Altogether 583 banking places).

The Bank of France is not only a national institution by the exclusive location in France of its chief offices and branches, but it will not discount any bills unless the latter are created in France or, at least, endorsed by two French signatures; all collateral loans must be guaranteed by French securities which are themselves guaranteed by the state; its bank notes are circulated only within French territory (not in the French colonies). Finally all the members who make up the general assembly of the shareholders as well as the governor, the two sub-governors and all the employees, who number more than 7,000, must be of French nationality. If, for instance, a French young lady in the service of the bank marries a foreigner, whatever may be his nationality, she acquires the nationality of her husband and therefore cannot continue in the service of the bank. For all its national characteristics the Bank of France is a private joint-stock company and not an establishment of the state; that is the reason why it had been able during the Franco-German War of 1870-71 to keep entirely safe its real property, its metallic reserve and all its securities as being strictly private. "According to its statutory articles," writes Frederick William in one document, "the Bank of France is a private institution whose only purpose is to further commerce and industry. Consequently the funds kept in that establishment are not liable to any distraint nor any execution so far as they are not intended for the use of the army." It must be added, however, that at the end of August 1914 when the Germans were marching on Paris, all the gold of the Bank of France as well as its securities were being fast removed from the capital to other centres. France could not afford to run any risks about its gold reserve which amounted to 4,100,000,000 francs.

Regulation of Note Issue.— It is an interesting point to know how the state has regulated the issue of banknotes. First of all it must be said that there is no necessary relation between the amount of metallic reserve and the circulation of banknotes. The emission of the latter is regulated by what has been termed the "banking principle." The bank can issue its notes freely and create, for its own use, a new capital; but the latter can be used only for two banking operations, viz., discounting commercial bills and advancing money upon approved securities, whence the term of "banking principle." Of course, there is a limit fixed by the state to the issuing of notes; but whenever it becomes necessary, that is to say, whenever the discounts and loans are in increased demand, owing to expansion in trade, the state modifies the maximum of emission and allows a new margin. The value of the banknotes is therefore always fully represented first by commercial bills discounted, of very short maturity (at most 91 days), second, by loans upon approved securities, with a considerable margin, and last, not least, by its metallic reserve of gold and silver.

Although the bank is not required to keep a minimum gold reserve, its policy has always been to accumulate as much yellow metal as possible. It is true that the bank has also the right to pay its notes in silver coin; for practical purposes, however, gold is the only metallic reserve that really counts and the bank has never made any great effort to increase its silver reserve. In 1916 the bank held 5,076,600,000 francs in gold and 299,100,000 francs in silver in reserve, and had in circulation notes to the value of 16,500,700,000 francs.

Relations with the State.— The state is entitled to a portion of the net profits of the bank over and above stamp duties and ordinary taxes which the Bank of France is bound to pay just as any other joint-stock institution of the same kind. First of all there is a special stamp duty on all bank notes; in the year 1908 the amount of money paid to the state on that account was no less than 1,400,000 francs for an average circulation of 4,800,000,000 francs. In 1897 when the privilege was renewed the state stipulated from the bank that it should pay to the treasury an annual royalty consisting of the eighth part of the average rate of discount multiplied by the amount of the "circulation productive," that is to say, by the amount of collateral loans and discounted bills. The taxes which the bank has to pay, on all accounts, in exchange for its privilege, reach about the fourth part of its net profits. Besides, the bank must grant to the state a permanent advance of 200,000,000 francs without charging any interest. The bank is moreover the cashier and treasurer of the state, it keeps an account with all sub-treasuries which deposit their funds and withdraw them without being charged any commission. Whenever there is a national loan, the bank receives all applications without charging any commission to the Minister of Finances; it pays all dividends on government bonds, distributes funds to all public offices, etc., always at its own expense. In exceptional circumstances, however, the bank may be allowed to lend nearly any amount of money to the state; during the Franco-German War of 1870-71, the loans granted to the French government reached 1,600,000,000 francs which were paid off within eight years. Up to the present time during the Great War, the Bank of France has lent more than 10,000,000,000 francs to the government. In 1915 the bank paid to the state on account of royalty, taxes, etc., 23,009,649 francs.

Banking Operations.— The most important transaction of the Central Establishment consists in the discount of commercial bills. The latter must be payable within 91 days, none of longer maturity being eligible for discount; they must bear three approved signatures. Since the last renewal of the privilege (1897), the very smallest denominations down to five francs are accepted for discount by the bank; this makes the establishment as popular as possible and the accounts of all sorts which in 1897 numbered only 27,304 amounted in 1908 to 91,458 and in 1914 to 147,800. In the latter year 21,953,000 bills, amounting to 18,802,000,000 francs, were discounted.

The rate of discount is of course a matter of very great importance for the commercial community. In France, money is never very dear and there is much more stability in the rates of discount at the Bank of France than at either the Bank of England or the Imperial Bank of Germany. Between 1898 and 1913, for instance, the official rate of discount was changed 62 times in Germany and 79 times in England whilst it was changed only 14 times at the Bank of France.

Even during the Great War the Bank of France did not raise the rate of discount to the excessive level which was reached by some of the foreign issuing banks. Only for about 20 days in August 1914 the rate was as high as 6 per cent and has been now for over two years and a half reduced to 5 per cent, whilst the Bank of England had (for a very short period) to charge 10 per cent. Next to discounts the most important banking transactions of the Central Establishment consist in collateral loans. All the money which is advanced to its customers must be guaranteed by French Rentes and other national and colonial bonds which enjoy the guarantee of the government.

The rate of interest upon such loans is always 1 per cent or one-half per cent higher than the rate of discount. The reason is that discounts are always necessarily useful to trade and industrial or agricultural activity, whilst this is not always necessarily the case with loans upon securities. The following table shows the average amounts of the bank collateral loans from 1897 to 1915:

COLLATERAL LOANS OF THE BANK OF FRANCE.
(Yearly averages in millions of francs).

YEARS	Amounts	YEARS	Amounts
1897	358.0	1907	547.6
1898	361.6	1908	503.6
1899	403.8	1909	487.2
1900	451.2	1910	505.8
1901	472.0	1911	590.6
1902	415.3	1912	645.5
1903	428.6	1913	693.0
1904	477.9	1914	697.4
1905	459.8	1915	562.0
1906	473.7		

The bank receives deposits of money which may be withdrawn by cheques or transfers, but no interest whatever is paid on these moneys. The deposits, however, are always very important for two reasons. The first is an absolute confidence of the depositors, the second is that the bank is the clearing-house of France. All the persons who have a deposit or current account at the bank can transfer credits or liquidate their balances by *virements*, that is to say, by an order of transfer of credit from account given to the bank and at the same time by giving notice to the payee that his own account has been credited. Such transfers are made free of charge from any banking place to any other (there are 583 banking places). It is a method of settlement which is very much of the same character as that of a central clearing-house.

Finally the bank undertakes many operations of minor importance from which no great profit is derived, and for the main reason that they are of great convenience for its customers; the bank, for instance, takes orders for sales or purchases of securities on the stock exchange, that is to say, it transmits such orders to the Agents de Change (stockbrokers) who have a monopoly as regards all transactions at the Bourse.

DIVIDENDS OF THE BANK OF FRANCE.
(Period from 1898 to 1915).

YEARS	Profits alloted to shareholders	Dividend per share	Average price of the shares	Proportions of dividends to average price of the year
	Francs	*Francs*	*Francs*	*Per cent*
1898	20,075,000	110	3,685	2.98
1899	23,725,000	130	4,070	3.19
1900	26,462,500	145	4,035	3.59
1901	21,900,000	120	3,770	3.18
1902	21,900,000	120	3,797	3.16
1903	23,725,000	130	3,812	3.41
1904	23,725,000	130	3,830	3.39
1905	23,725,000	130	3,805	3.41
1906	27,375,000	150	3,939	3.81
1907	31,937,500	175	4,067	4.30
1908	29,200,000	160	4,185	3.82
1909	25,550,000	140	4,270	3.28
1910	25,550,000	140	4,277	3.27
1911	25,550,000	140	4,088	3.42
1912	29,200,000	160	4,380	3.65
1913	36,500,000	200	4,650	4.30
1914	34,675,000	190	4,275	4.44
1915	36,500,000	200	4,582	4 36
Totals	487,275,000	2,670	73,517	....
Averages	27,070,800	148	4,084	3.62

It keeps securities on deposit, and lets safes in its vaults, not only in Paris, but in 156 branches (*succursales*) and sub-offices (*bureaux auxiliaires*) as well. The preceding table shows the dividends of the Bank of France from 1898 to 1915.

The Bank of France During the Great War.—In November 1911 the bank agreed to lend to the government in case of mobilization 2,900,000,000 francs. This amount was raised to 6,000,000,000 francs in September 1914, to 9,000,000,000 in May 1915 and to 12,000,000,000 in 1917. Such advances are granted to the state at a rate of interest of ¾ of 1 per cent. The limit of 9,000,000,000 would have been exceeded in 1916 if the government had not repaid part of its debt to the bank (about 4,000,000,000 francs), out of the proceeds of the two first national loans. Besides these advances granted direct to the French government, the bank, without being obliged to do so, had lent up to February 1917, over 2,000,000,000 francs in discounting French treasury bills the proceeds of which have been lent mainly to the Russian government. When the French National Loans were issued the bank received the applications of subscribers throughout France without charging any commission to the government: For the first War Loan the bank received, from 300,798 subscribers, nearly 3,000,000,000 francs. For the second War Loan the bank received from 828,652 subscribers nearly 4,000,000,000 francs. Besides these long-term loans, the bank sells daily over its counters French treasury bills in denominations which may suit any investor since the lowest of them is 100 francs. Whenever such bills come to maturity within three months, they may be discounted at the bank; and when they have more than three months to run before maturity, they are accepted by the bank to the extent of 80 per cent as collateral for loans. In 1915 the sales of these *Bons du Trésor* through the Bank of France and its branches reached the amount of 1,902,000,000 francs; in 1916 3,575,000,000 francs. From the beginning of the war to the end of December 1916, 1,057,483,000 francs in gold were sent abroad by the bank in order to maintain the foreign exchanges. Nearly the whole of that huge quantity of gold (about 900,000,000 francs) was sent to the Bank of England as a consequence of agreements signed by the British and French governments. In exchange of gold, France obtained in London a certain amount of credit which exceeded of course the amount of the shipments of gold. In spite of these exports of the precious metal the reserve at the Central Bank has always been very large. A great quantity of the gold in circulation (2,000,000,000 francs up to February 1917) was in fact brought by the French people to the central reserve where it was exchanged for notes always at par, the notes of the Bank of France having never lost any portion of their full face value. In 1915, a credit of $20,000,000 was obtained, under the auspices of the Bank of France, from a group of banks and trust companies of New York (headed by Messrs. Brown Brothers); these credits were renewed in 1916; arrangements were also made with the National City Bank of New York for the establishment of dollar credits in that city where French payments have always been extensive during the war. From 27 July to 1 Aug. 1914, the discounts of the Bank of France were raised from 1,500,000,000 francs to 3,041,000,000; two months later the discounts reached nearly 4,500,000,000 francs. The private banks had to unload their own discounts to the Central Bank, just as we understand here that the member banks of any Federal reserve bank in the United States would rediscount their commercial paper at their own reserve bank, if they wanted to liquidate their assets in case of a run of their depositors. In fact that possibility of rediscount, thanks to the elasticity of the issuing system of banknotes for commercial purposes, saved France from a financial catastrophe. Not one private bank failed in spite of the rapidity with which the war was declared. These discounts at the bank had been reduced gradually and steadily, week after week, to 1,838,000,000 francs at the end of 1915, and to 1,341,000,000 at the end of 1916 in spite of the moratorium. It is an unmistakable sign of the vitality of France, of its economic and staying power and of the soundness of its finances.

The Bank of France is a living organism, very much respectful of the traditions of the past, but always alive to the economic changes of the present and the possibilities of the future. The great European War is bound to create new developments and great changes; consequently dangers, such as an inflation of notes. But the bank, since its foundation, has weathered many storms, witnessed many changes, political, social, economical, a great national reverse in 1871; now it may be compared to an old lady who has got much experience and deserved the confidence of the world for more than 100 years, and there is no Frenchman doubting that she will weather the greatest storm which might well have swept away not only a very respectable institution but civilization as well.

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FRANCE, Institute of. See INSTITUTE OF FRANCE.

FRANCE, Isle of. See MAURITIUS.

FRANCE, Reformed Church of. See HUGUENOTS.

FRANCESCA, Piero della, also called PIERO BORGHESE, Italian painter and writer: b. at Borgo-San-Sepolcro, about 1401; d. between 1494 and 1509. He came of a family of some note, and was given a good education, for his time. He studied mathematics and painting, and was the first to make use of geometry in his art, thus winning the right to be called «the father of perspective in painting.» He also studied the cause and effects of light and succeeded in producing excellent light effects. It is said that, becoming blind at the age of 60, he continued his interest in his work by gathering about him the young and ambitious painters to whom he gave lectures on their art and whom he invited to consult him with regard to their difficulties and problems. As a painter he belonged to the Florentine school. He had much of the vivacity of his mother who was French and who seems to have inspired him with French ideals. At any rate it was out of regard for her that he called himself «Francesca» (son of France), instead of Borghese, which was properly his family name. There does not seem to be any certainty as to who were his teachers; but the probabilities are that he was largely self-taught. He studied the actions of the human body, the workings of the muscles and the effects of different kinds, grades and colors of cloth subject to different light effects; and he made little figures which he dressed with care for those and other artistic experiments. He thus set an example of care in his work, of the use of models and of careful study in the production of artistic effects that bore good fruit in the followers of his school, in his pupils and in his brilliant successors. Early in his career Francesca painted small-sized pictures for Guido Antonio Monte-Feltro, Count of Urbino, who seems to have extended him his protection. In the public gallery of Florence are pictures by Francesca of members of this family, Federico de Monte-Feltro and his wife, Bantista Esforcia. He also painted frescoes in the Vatican at Rome, and in churches in Milan, Ancona, Borgo-San-Sepolcro, Pesaro and Arezzo. The church of San Francisco in Rimini had a series of frescoes painted by Francesca in 1451, in which he depicted Sigismondo Malatesta, Lord of Rimini, kneeling before the saint of his own name. His most distinctive work was the 'Story of the Cross,' a series of remarkable frescoes in the church of San Francisco at Arezzo. Among his other paintings are a 'Madonna' (Brera); 'Flagellation of Christ' (Urbino Cathedral); 'Saint Louis of Toulouse' (town hall, Borgo-San-Sepolcro); 'Resurrection' (town hall, Borgo-San-Sepolcro); 'Hercules' (Gardner Collection, Boston); 'Magdalena' (Arezzo Cathedral); 'Baptism of Christ' (National Gallery, London); 'Annunciation' (Perugia Gallery); 'Nativity' (National Gallery, London); 'Triumph of Chivalry' (New York Historical Society); 'Saint Thomas Aquinas' (Poldo Pezzoli Collection, Milan). All these pictures show the hand of the careful, conscientious artist. They mark a great advance in Italian painting. Their drawing is superior to that of most of Francesca's contemporaries and predecessors; their management of light and color is an advance on anything heretofore accomplished in Spain; and so thoroughly realistic are the scenes that they easily claim for their author the honor of being the greatest realist in painting of his century. As a writer on scientific subjects Francesca is also worthy of remembrances for his original investigations in perspective and geometry, respectively treated in the following works: 'Prospettiva pingendi' and 'De quinque Corporibus.' Consult. Calcagni, 'Memorie istoriche di Recanatil'; Mariolli. 'Lettre Perugine'; Ricci, 'Memorie storiche dell' arte e degli artisti della Marca d'Ancona'; Walters, 'Life of Francesca' (London).

FRANCESCA DA RIMINI, frăn-ches'kă dă rē' mē-nē'. This tragedy in five acts, in blank verse, or rather *vers libres,* by Gabriele d'Annunzio, was acted for the first time at the Costanzi Theatre, Rome, by Eleonora Duse (to whom the play is dedicated) and her company, 9 Dec. 1901, making one of those memorable first nights in theatrical annals, suggestive of 'Hernani' and 'l'Aiglon.' The play lasted five hours, portions of it being performed amid much confusion and noise. The tragedy has since been materially shortened, and has been played successfully in Italy, England and America. The subject is that first treated sympathetically by Dante in the fifth canto of the ‹Inferno› and one which became a favorite theme of poets. Upon this framework d'Annunzio has woven the first of his plays to attract popular favor. It is, however, more than a love tragedy; it is a study of one of the most sanguinary epochs in Italian history, the 13th century. He himself defines it as a poem of "blood and lust," and in this it differs markedly from Dante's poem, made all of pity, tenderness and love. D'Annunzio's tragedy has more dramatic action than is found in his previous plays and is not lacking in energy, bringing vividly to mind the historical and literary pictures the student of that barbarous age is used to look upon. Yet while the action does move onward, nevertheless the deviations from the straight course are so numerous, and in many cases so long and winding as to make the work rather a series of highly polished lyric poems abounding in beautiful description, in which realms the author is invariably at his best, than a dramatic production in the ordinary sense. It is a "d'Annunzio" drama. Among the 20 or more *dramatis personæ,* not including archers, men-at-arms and the like personnel, four focus and hold the attention throughout the play, Francesca, Paolo, Gianciotto and Malatestino, Gianciotto's brother. The women who make up Francesca's attendants are suggestive, especially by their singing of the Greek chorus, contributing to the understanding of the period and to the events which occur in the play, as do also the slave, the merchant, the doctor, the court jester, the astrologer and other supernumeraries, all of these accessories differentiating notably this version of the play from the literary treatment of the subject by other authors. Despite the fact that the blackest crimes known to humanity constitute the material of the play, there are throughout the tragedy passages in a lighter vein admirable in their way, girlish jesting and chattering, scenes of bright foolery between the jester, the voluble merchant, the astrologer and the damsels, revealing the hand of a poet remarkably gifted. D'Annunzio's vocabulary is extraordinary, for he has drawn freely on the most fitting words of old and modern Italian, and in a manner likely to enrich permanently the Italian language. Arthur Symons has translated ‹Francesca da Rimini› (New York 1902), reproducing both the spirit of the play and the form of the verse with unusual accuracy. The wonderful power and charm of d'Annunzio, however, defies translation, for they lie largely in his use of words, bringing out the possibilities of the Italian language as never before by any modern writer. Consult Gargiulo, Alfredo, ‹G. d'Annunzio› (pp. 298–316, Naples 1912); Zaldumbide, G., ‹La evolución de G. d'Annunzio› (pp. 241–268, Paris 1909); Huneker, James, ‹Iconoclasts› (pp. 333–338, New York 1905).

FRANCESCO DI PAULA, or **SAINT FRANCIS OF PAOLA,** Italian monk: b. Paula or Paola, Calabria, 1416; d. Plessis-les-Tours, 2 April 1507. At the age of 13 he was the inmate of a Franciscan convent; and at 19 retired to a cave where he inflicted on himself every species of self-mortification. The fame of his piety having attracted to his cell several emulators of his austere life, he obtained permission to erect a convent, and the new community received from Pope Sixtus IV the title of the Hermits of Saint Francis of Assisi; but the title was changed by Alexander VI to Minim-Hermits of Saint Francis of Paola. The founder established numerous communities in Italy, Sicily, France, Spain and Germany, but the Minims were never settled in Great Britain or Ireland. To the usual conventual vows, Francesco added one of the most rigorous abstinence — flesh, eggs, cheese and milk being strictly forbidden the entire year, except in illness. In Spain they were called the Brothers of Victory, in commemoration of the deliverance of Malaga from the Moors. Twelve years after his death he was canonized by Leo X, and the Roman Catholic Church celebrates his festival on 2 April.

FRANCHE-COMTÉ, frănsh-kom'ti, a province of Old France, now formed into the departments of Doubs, Haute-Saône, Jura and part of Ain. It was the homeland of the ancient Sequani. It had a chequered history throughout the entire period of the Middle Ages, passing from one robber-baron to another, until it passed to Louis XIV by the Treaty of Nimeguen in 1678. Cuvier and Victor Hugo are among its famous sons. Besançon, the ancient Vesontio, was the capital of the province. See FRANCE — HISTORY.

FRANCHETTI, frăn-chĕt'tē, **BARON Alberto,** Italian composer: b. Turin, 1860. He was a pupil in Coccon and Magi, studied at Dresden and Munich, and in 1888 produced his most successful opera ‹Asraele.›

FRANCHEVILLE, frănsh'vē', or **FRANQUEVILLE, Pierre,** French sculptor: b. Cambrai, 1548; d. about 1618. Against his parents' wishes he went to Paris to study art, and because of further opposition left France and went to Germany and Austria. He studied for a time also in Florence, where he assisted Giovanni da Bologna in many of his works. In 1585 he went to Genoa, and there executed the figures of Jupiter and Janus in the Grimaldi Palace, and the Evangelists, Saint Ambrose and Saint Stephen, groups for the cathedral. In the Nicolini Chapel, Florence, are his figures of Humility, Chastity and Wisdom. He modeled the doors of Pisa Cathedral and soon after became court sculptor to Henry IV of France. The Louvre contains his ‹David›; ‹The Conquered Nations› and ‹Orpheus› and in the garden of the Tuileries are the groups of ‹Time and Truth› and ‹Saturn and Cybele.›

FRANCHISE, in law, originally a right belonging to a subject of exercising a branch of the sovereign or government prerogative, either in virtue of a grant conferring such right, or by prescription, which always presupposes such a grant. In modern usage, a special privilege granted by a governing body, to an individual or corporation to perform some work or function that is withheld from others. A special privilege of minor importance, which usually can be had by any one paying the fee, is termed a license. It is now generally conceded that the State legislatures and governing bodies of cities in the United States have been far too liberal in the granting of franchises, so that public utilities have largely passed out of the control of the people, and are exploited for private or corporate gain. The right to vote is also popularly termed a franchise, doubtless because it was at first conceded as a privilege by royalty. See UNITED STATES — SUFFRAGE IN THE.

FRANCHISE, Electoral. See ELECTORAL QUALIFICATIONS; WOMAN SUFFRAGE; ELECTIONS; ALIENS; NATURALIZATION; VOTE, VOTERS, VOTING; UNITED STATES — SUFFRAGE IN THE.

FRANCHISE TAX, a tax on public service and private corporations for the purposes of governmental revenue and indirectly to effect a sharing of profits with the public. In its widest application it includes patents, copyrights, inheritance, etc., besides those franchises and rights conferred by government for conducting an occupation in a particular way, or accompanied with particular privileges. Its application to public service corporations was justified as a payment for the right to use streets, highways and public places for special purposes. Between a domestic corporation with its state franchise and a corporation in a state with a foreign charter, a distinction exists. A state can impose a tax only on privileges which it grants; it, however, taxes foreign corporations as to the amount of their business, thus adding to state revenue.

The sharp distinction between a corporate franchise and a corporate charter must be recognized. A franchise is the permission given a private corporation to use public property in the public interest, to occupy a particular street or highway with its tracks, wires, pipes, etc. A charter is the state grant to an association of individuals to do business as a corporation. The development of the franchise tax arose chiefly on account of the difficulties in collecting the general property tax. The general method employed to determine the value of the franchise in regard to public service corporations which have monopolistic privileges is to subtract the value of the real estate and other physical property from the value of the securities and to consider the difference as the value of the franchise. This process is usually called the corporate excess. In Massachusetts the corporation pays the tax directly to the state. The receipts are distributed to the towns and cities in proportion to the number of shares owned, or in the case of street railways, according to the miles of street railway owned in each town. With deductions made for real estate and other items locally taxed, shares are assessed at their market value. Plehn classifies four different methods of obtaining revenue from the franchise of a public service corporation: (1) to consider the privilege as property and to include this in the valuation of taxable property; this valuation may be arrived at in one of two ways: (a) by valuing the tangible property and then adding an amount equal to the difference between that and the value of the stock, including bonds; this is the "corporate excess" previously referred to, so termed in Illinois, or the "value of the franchise," as in California, or "the value of the tangible property," as used in other States; (b) by ascertaining the earnings and capitalizing them; and then proceeding as in the first plan to obtain the corporate excess; (2) to tax the net earnings; (3) to tax the gross earnings; (4) to levy special annual license taxes. Objections, however, can be raised against any of these methods. The corporation annual license fee in some States is called a franchise tax. In New Jersey, for instance, the tax is one-tenth of 1 per cent on capital up to $3,000,000 with decreasing rates for larger amounts. Consult Seligman, E. R. A., 'Essays on Taxation' (New York 1898); Plehn, C. C., 'Introduction to Public Finance' (New York, 3d ed., 1909).

FRANCHISES, in the most general sense, rights or privileges conferred by the government upon particular persons not otherwise possessed by them by common right; more specifically, the grants by which governmental authorities confer the right to use the streets of a municipality upon those who supply the community with services or commodities which are in the nature of public utilities. This right to use the streets is set forth in a document which is itself called a franchise. Franchises must be secured by those who furnish to cities their water, electricity, gas, telephone and telegraph services and street car facilities.

Legal Nature of Franchises.— In its legal nature a franchise is a binding contract between those granting it and those receiving it. As such it is protected by the clause of the Federal Constitution which forbids the States to make any law impairing the obligation of contracts. Accordingly when a State or city has granted a franchise it cannot revoke nor change its terms without the consent of the grantee unless the right to do so has been specifically reserved to it by the terms of the franchise itself. This has been held true even in cases where franchises were secured by bribery or fraud. Such revocation or alteration may, however, be accomplished by mutual agreement. The violation of the terms of the franchise by those who hold it may result in its forfeiture, just as the breach of any contract by one party relieves the other of obligation. The public, furthermore, can take the rights and privileges so granted by eminent domain proceedings provided just compensation is paid for the property rights thus destroyed. Like all other contracts or grants by which the State or city binds itself, a franchise is subject to the reasonable exercise of the police power of the State in the interests of public health, safety, morals, good order and general welfare. As a result of this rule a street railway company, for example, may be subjected to control in the matter of speed of cars, place of stopping them, watering of tracks or the installation of safety devices, when the public welfare demands such control, even though it be operating under a franchise which is silent upon those points, or which purports in express terms to free the company from such control. The courts have applied to franchises the rule of strict construction, and any doubt as to whether a right or privilege has been given by a franchise is resolved against the grantee and in favor of the public on the theory that the city or State can be presumed to have granted nothing not set forth in express terms. Accordingly the rights given by a franchise will be held not to be exclusive unless their exclusive character is specifically declared.

The Granting of Franchises.— The granting of a franchise is an exercise of legislative power. When not restrained by constitutional prohibitions the State legislature may grant them directly even over the protest of the municipality concerned. The first period in the history of franchise grants in the United States was that in which State legislatures conferred franchises by special laws upon corporations usually created by special laws. There is no blacker page in American political history than this. Franchises were secured by the most brazen dishonesty and bribery, and reputable political leaders openly bartered them for party campaign funds. The terms of most of these early franchises were naturally in gross violation of the public interest. Many of the grants were perpetual. In return for the almost invaluable rights with which the State parted it received as a rule nothing. It received no money and it retained no adequate power of regulation over the grantee in the matter of service, rates or extensions. It reserved no power to prevent gross over-capitalization. Many cities are still suffering from the corrupt and improvident franchise grants made during this period. The second era of franchise history began in the latter part of the 19th century with the movement to forbid the creation of corporations or the granting of privileges by special law. Municipalities, acting under delegated authority as agents of the State, took over the power to grant franchises. This system did not prove to be a very substantial improvement. At the present time a third policy, that of vigorous control over franchise grants, is in force in most parts of the United States. Three types of restrictions are commonly found. First, no franchises may be granted by special act of the State legislature. Second, the people of the municipality concerned may be given the right to approve or disapprove the franchise by voting on it. Third, public utility commissions may be created either with very limited authority or with a high degree of power over the terms and conditions upon which the franchises shall be issued as well as over the grantee thereafter.

Taxing of Franchises.— Franchises are subject to taxation unless they are specifically exempt therefrom by their own terms. In the first place they may be taxed as property at their fair value, either separately or as part of the assets of the corporation holding the franchise. In the second place, since franchises are special privileges which the State is not obliged to grant, it may stipulate the payment of heavy special taxes as a condition of granting the franchise, or as the price of not revoking it when once granted. Most students of the franchise question believe that it is contrary to public policy to place special taxes upon franchises, at least those hereafter to be granted. Such taxes are ultimately shifted to the consuming public in the form of increased prices for the services supplied. It is urged that the grantee of a franchise should be subjected to so many obligations and duties in return for the special privilege enjoyed that the money value of the franchise itself would be very small. It should then be taxed in common with other property at its fair value.

By what governments franchises are taxable in the United States is a problem of some complexity. This is especially true if the term franchise is used in a broad enough sense to include the right of a corporation to carry on business under the terms of its charter, a meaning frequently given to the word. It is well established that a franchise granted directly by the Federal government cannot be taxed by a State or any subdivision thereof. Otherwise a State, by heavy taxation, could destroy entirely the privilege or right thus granted by the national government. This rule, however, does not prevent a State from taxing such property of a corporation holding a Federal franchise as may lie within its jurisdiction. It would be equally true that franchises granted by the States are free from national taxation were it not for the fact that the Federal government frequently assumes jurisdiction over such franchises by reason of its power to regulate interstate commerce. A further limitation upon the power of the State to tax franchises is found in the rule that no State can tax or burden the right to engage in interstate commerce. Whether the franchise to engage in such commerce is granted by the Federal or the State government it is equally free from State taxation. Nor can a State tax as such the franchise of a corporation chartered by another State since that franchise is regarded as property only in the State which grants it. No corporation, however, has a right to carry on business not interstate in character in any State except that of its creation without obtaining special consent. As the price of this privilege a State may demand practically anything it sees fit. Thus while a State may not tax the franchise of a foreign corporation as such it may require it to pay as the privilege of doing business within its borders a tax measured by the entire capital stock of the corporation, a sum which includes the value of the franchise which it may not tax directly. Many students of the problem advocate the Federal incorporation of corporations engaged in interstate commerce in order, among other things, to secure relief from the injustices and inconveniences arising from the existing system of franchise taxation.

Provisions of Franchises.— The provisions of franchises differ widely according to the date of issuance, the municipality or other authority granting them and the purposes for which they are given. Any adequate franchise at the present time deals with the following points: (1) *Tenure.* Three policies may be followed in fixing the tenure of a franchise. First, it may be perpetual, although in many States this is now expressly forbidden. Second, it may be for a fixed term of years, as 20 or 25. Third, it may be indeterminate in duration, allowing the municipality to revoke it at will after a plan which protects the rights of the grantee. (2) *Compensation.* It is common at present to secure to the State or city something in return for the valuable rights given in a public utility franchise. This may be done in a number of ways; (a) a lump sum may be required as a fee; (b) payment may be required in kind, as when a water company supplies a city without charge with water for fire protection; (c) other services may be required of the grantee, such as paving or watering of the streets occupied; (d) a certain percentage of the earnings of the corporation may be taken annually as a tax. (3) *Rates, service and extensions.* Provision may be made to have these matters handled by a periodic revision of the terms of the franchise by the municipal authorities or by a permanent public utility commission. Most franchises contain elaborate provisions relating to all these matters. (4) *Laborers and strikes.* Continuity of service is vital in the case of a public utility and interruptions due to labor disputes may be sought to be avoided either by fixing the conditions of labor in a satisfactory manner in the franchise itself or by requiring the arbitration of such disputes. (5) *Capitalization.* So many evils have arisen from the overcapitalization of public utility companies that it is wise to regulate this matter closely by definite restrictions and by requirements of publicity regarding the financial operations of the grantee. (6) *Reversion to the city.* Some modern franchises contain stipulations of the conditions under which the rights granted will revert once more to the city together with the properties acquired by the public utility corporation. The transition to a system of municipal ownership is made possible in this way. The provisions now found in many franchises afford a reasonably adequate protection to the public interests involved in the important services rendered to the community by public service corporations. Consult Beard, C. A., ‘American City Government’ (New York 1912); Joyce, ‘Treatise on Franchises’ (ib. 1909); King, ‘Regulation of Public Utilities’ (ib. 1912); Munro, ‘Bibliography of Municipal Government’ (1915); Pond, ‘Public Utilities’ (1913); Whinery, ‘Municipal Public Works’ (New York 1903); Wilcox, ‘Municipal Franchises’ (1910).

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FRANCIA, frän'chä, easel name of Francesco di Marco di Giacomo Raibolini, Italian painter: b. Bologna, 1456; d. there, 5 Jan. 1517. He assumed his name of Francia from that of the goldsmith under whom he began his art studies. He was a pupil in painting of the Ferrarese, Lorenzo Costa, and shows the influence of his master's style. He painted portraits and history, his greatest work being the Bentivoglis altarpiece, in the church of San Giacomo Maggiore, Bologna.

FRANCIA, frän'sē-ä, **José Gaspar Tomas Rodriguez da,** Paraguayan dictator: b. Asunçion, about 1756; d. there, 20 Sept. 1840. He was sent to the University of Cordova, with a view to entering the Church; but his plans underwent a change, and on his return to his native town with the degree of doctor of laws, he began his public career as a barrister. His high reputation for learning, but still more for honesty and independence, procured him an extensive practice; and he devoted himself to legal pursuits for 30 years. In 1811, when Paraguay threw off the Spanish yoke, he became secretary of the junta appointed by Congress. In 1814 he was appointed dictator for three years, and in 1817 he was continued in authority for life. No sooner had he reached the goal for which he had been striving than he began to display the utmost tyranny in his administration. He was kindly disposed toward foreigners, till they excited his jealousy by the culture of Paraguay tea, of which he made a state monopoly. After everything had been placed completely at his beck he seemed, in 1824, disposed to return to milder courses, but a new attack of his constitutional malady led him again to a renewal of his tyrannical proceedings; but as Paraguay had improved under his government, and the inhabitants had become reconciled to his tyranny, he was able to continue his system till his death.

FRANCIABIGIO, frän-chä-bē'jō (the easel name of Francesco di Cristofano Bigi), Italian painter: b. Florence, 1482; d. there, 24 Jan. 1525. He was a pupil of Albertinelli, where he met and made a freind of Andrea del Sarto. The two artists painted in collaboration the frescoes in the Santa Annunziata Church at Florence. In these paintings the influence of del Sarto is very apparent, as well as in the ‘Last Supper,’ which Franciabigio painted in the refectory of San Giovanni, and the oil painting at Dresden, ‘David and Bathsheba.’ He has left many excellent portraits, one of which is in the Berlin Museum.

FRANCILLON, Robert Edward, English novelist: b. Gloucester, England, 25 March 1841. He was educated at Trinity Hall, Cambridge. He was admitted to the bar in 1864 and was on the staff of the London *Globe* 1872–94. His novels are ‘Earl's Dene’; ‘Pearl and Emerald’ (1872); Olympia’; ‘Strange Waters’; ‘Zelda's Fortune’; ‘A Real Queen’; ‘Queen Cophetua’ (1880); ‘Under Slieve-Ban’ (1881); ‘King or Knave’ (1888); ‘A Dog and his Shadow’; ‘Jack Doyle's Daughter’; ‘Ropes of Sand’; ‘Gods and Heroes,’ etc.

FRANCIS I, king of France: b. Cognac, France, 12 Sept. 1494; d. Rambouillet, 31 March 1547. He succeeded to the throne in 1515, on the death of Louis XII, who died without male issue. As grandson of Valentino of Milan, he put himself at the head of an army to assert his right over the Milanese. The Swiss, who opposed him in his entry into the duchy, were defeated at Marignano (or Melegnano), and Milan fell immediately after this victory. After a short war with England, the famous interview between Henry VIII and Francis took place, in 1520, in Flanders, which, from the magnificence displayed on the occasion, was called The Field of the Cloth of Gold (q.v.). In the same year, Charles V of Spain having inherited the empire after the death of Maximilian Francis laid claim to the imperial dignity and declared war against his rival. In this struggle, however, he met with nothing but reverses. After the defeat of Marshal Lautrec at Bicoca, in 1522, the retreat of Bonnivet, and Bayard's death, Francis was himself, in 1525, beaten at Pavia, and taken prisoner. The fight had been a fierce one, and the king wrote to his mother, “All is lost, except honor.” Led captive into Spain, he recovered his liberty only at the cost of an onerous treaty, signed at Madrid in 1526; but which Francis subsequently declared null and void. He immediately recommenced war in Italy, met with fresh defeats, and concluded a second treaty at Cambrai in 1529. He once more invaded Italy, in 1536, and, after various successes, consented to a definite arrangement at Crespi, in 1544, by which the French were excluded from Italy, though Milan was given to the Duke of Orleans, the second son of Francis. Francis was a friend to arts and literature, which flourished during his reign; and he was called the "Father of Letters." Justice, also, began to be better administered in his reign. He founded the Royal College of France, the Royal Library and built several palaces. He was succeeded by his son, Henry II.

FRANCIS II, king of France, son of Henry II and Catharine of Medici: b. Fontainebleau, 19 Jan. 1544; d. Orleans, 5 Dec. 1560. He ascended the throne on the death of his father 10 July 1559. The year previous he had married Mary Stuart, only child of James V, king of Scotland. During his short reign of 17 months were sown the seeds of those evils which afterward desolated France. The uncles of his wife, Francis, Duke of Guise, and the Cardinal of Lorraine, held the reins of government. The latter stood at the head of the clergy, and had charge of the finances. The former had the direction of military affairs; and both used their power solely as a means of gratifying their pride and avarice. Antony of Bourbon, king of Navarre, and his brother Louis, Prince of Condé, provoked that two strangers should govern the kingdom while the princes of the blood were removed from the administration, united with the Calvinists to overthrow the power of the Guises, the protectors of the Catholics. Ambition was the cause of the quarrel, religion the pretext, and the conspiracy of Amboise formed among the French nobility, especially the Calvinists, with the object of removing the king from the influence of the Guises, the first symptom of the civil war. The war broke out in March 1560. In December of the same year Francis died, leaving the kingdom loaded with debt, and a prey to all the miseries of civil war.

FRANCIS I, Holy Roman Emperor: b. 8 Dec. 1708; d. Innsbruck, 18 Aug. 1765. He was the son of Leopold, Duke of Lorraine. He inherited this duchy from his father in 1729, and six years afterward exchanged it for that of Tuscany, which the death of the last of the Medicis had rendered vacant. In 1736 he married Maria Theresa, the daughter of the Emperor Charles VI. On the death of the latter, he disputed the imperial dignity with the Elector of Bavaria, whom France supported, and who took the name of Charles VII; he was, however. defeated, and Francis became Roman emperor in 1745, as co-regent. He reigned peaceably for 20 years. He had 16 children, among whom were Joseph II, who succeeded him, and the unfortunate Marie Antoinette. See MARIA THERESA.

FRANCIS II, Holy Roman Emperor and as FRANCIS I of Austria: b. Florence, Italy, 12 Feb. 1768; d. Vienna, 2 March 1835. He succeeded his father, Leopold II, in 1792, as Holy Roman Emperor, King of Bohemia, Hungary, etc. At the very commencement of his reign, he had to sustain a war against France, in which he was defeated, and was, in 1797, obliged to sign the treaty of Campo Formio, which deprived him of the Netherlands and Lombardy. Another war taking place with the same power, he was not more fortunate than in the first, and was beaten at Marengo, and lost, by the Treaty of Lunéville, in 1801, all his possessions on the Rhine. In a third campaign, undertaken in 1805, the French were victorious over his armies at Elchingen, Ulm and Austerlitz; and the Treaty of Presburg still further diminished his territory. Renouncing now the title of Holy Roman Emperor, loudly styled Emperor of Germany, he took the title of Emperor of Austria, under the name of Francis I. He tried again the fate of battles in 1809; but the defeats of Eckmühl and Wagram led to the Peace of Schönbrunn, to cement which more strongly his daughter Maria Louisa was, in 1810, given to Napoleon I. Notwithstanding this alliance, however, he, in 1813, joined the coalition against his son-in-law and contributed considerably to his overthrow. The treaties of 1815 put him again in possession of the greater portion of his territory, and he reigned peaceably till his death.

FRANCIS I, king of the Two Sicilies, son of Ferdinand I: b. Naples, 19 Aug. 1777; d. there, 8 Dec. 1830. Twice during the lifetime of his father he carried on the government of the kingdom under the name of viceroy; first in 1812, when a constitution was granted to Sicily; and afterward in 1820, during the troubles which broke out in Naples and Palermo. He mounted the throne in 1825, and died 1830, without having achieved anything remarkable. He was succeeded by Ferdinand II.

FRANCIS II (Francesco d'Assisi Maria Leopold), king of the Two Sicilies: b. Naples, 31 Jan. 1836; d. 27 Dec. 1894. He succeeded his father, Ferdinand II in 1859, and attempted to carry out the monarch's policy. His dominions were invaded by Garibaldi in 1860 and Gaeta, his last stronghold, fell in 1861. Subsequently the deposed ruler lived in France in retirement, occasionally organizing abortive expeditions against the Italian kingdom.

FRANCIS JOSEPH I, emperor of Austria and king of Hungary: b. Vienna, 18 Aug. 1830; d. Schoenbrunn Castle, 21 Nov. 1916. He was the eldest son of Archduke Francis Charles and nephew of Ferdinand I, who reigned from 1835 to 1848. On the abdication of the latter and the renunciation of the crown by his father, Francis Joseph was proclaimed emperor on 2 Dec. 1848. He was then 18 years old, was the unanimous choice of the Austrian court and it was believed that his popularity would help harmonize the various conflicting interests. He had been educated very carefully under the supervision of his grandfather, the father-in-law of Napoleon I. He had mastered not only the classical and modern languages but nearly all the dialects of his polyglot fatherland. He had studied Roman, civil and canon law, chemistry and mechanics. He served in the field under Radetzky in Italy in 1848 and officers of high rank had taught him tactics, strategy and the art of making plans. He was fond of sport and exercise and won the first prize in a shooting competition with expert Tyrolese marksmen, who made him one of their guild.

At home he was opposed by Kossuth in Hungary, by Count Cavour in Italy and later by Bismarck in Prussia.

He made little or no effort to propitiate Kossuth or his followers, and in April 1849, four months after his coronation, Hungary was declared a republic. Simultaneously Francis Joseph proclaimed a new constitution which abolished all the ancient rights of the nation.

The Hungarian General Georgei defeated the emperor's troops in successive engagements and the emperor was forced to seek help from Tsar Nicholas. The latter responded promptly with 80,000 troops, which turned the tide of the war, and in August 1849 Kossuth was in flight and the Hungarian forces in complete subjection, Georgei having surrendered with a remnant of 5,000 men from his army.

In Italy the emperor's General Radetzky quelled the uprising speedily and Francis Joseph followed the dual victory by promulgating a new constitution. This totally failed to work, and two years later Austria became again an absolute despotism. The emperor took «Viribus Unitis» for his motto and let it be known that the state was to be as highly centralized as France under Louis XIV. Hungary and all the other provinces were governed from Vienna.

In 1855 a concordat was concluded with the Pope by which extraordinary privileges were conferred on the Roman Catholic Church in Austria. In 1859 the diplomacy of Cavour, the great Minister of Victor Emmanuel of Sardinia, and Louis Napoleon's zeal for military renown forced upon Austria the war with France and most of the Italian states. At Magenta and Solferino, Francis Joseph himself fighting in the latter battle and displaying conspicuous bravery, the Austrians were decisively defeated by the French army under Marshal MacMahon. The war resulted in the loss of Lombardy to Austria and only the intercession of Bismarck, watchful of Louis Napoleon's prestige, saved Venetia.

In 1866 Bismarck forced Francis Joseph into the disastrous Seven Weeks War, the pretext of which was a dispute with Prussia over the succession in Schleswig-Holstein. The Austrian emperor had the satisfaction of humiliating Italy, which took sides with Prussia, by decisive victories on land and sea, but this was small recompense for the crushing defeat sustained at the hands of the Prussians at Sandowa, or Koeniggratz. This one battle brought Francis Joseph to a treaty which solidified both Germany and Italy at his expense. To Italy, despite his victories there, he was forced to cede Venice through Napoleon III of France as intermediary; to Prussia he lost the last trace of the ancient Hapsburg hegemony over the German states and the ghost of the Holy Roman Empire was laid forever.

The immense loss of prestige following the war was accompanied by serious disaffection at home. The emperor and his ministers forthwith abandoned their policy of absolutism and promulgated a constitution for the Austro-Hungarian monarchy. Under it the emperor was crowned King of Hungary at Budapest in 1867. The form of monarchy adopted then remains in force to-day, and generally the method of governing the dual monarchy is the same. There has been bitter strife since then, with incessant demands for reforms and continual disturbances in the legislative assemblies, but the influences and strength of purpose of the emperor have served to keep the empire together and even to retrieve much of the prestige lost in the Seven Weeks War. In 1878 the congress of Berlin gave Austria the former Turkish provinces of Bosnia and Herzegovina, so that the emperor, notwithstanding his losses of territory in Italy, concluded his life as ruler of a territory more extensive than that he possessed in the beginning.

The emperor sustained as severe blows in his family relations as in war. His brother, the ill-fated Maximilian, was shot after the successful revolution against him as Emperor of Mexico. His wife, a beautiful but eccentric woman, was the Princess Elizabeth Amalie Eugenie, «Duchess of Bavaria» and daughter of Duke Maximilian-Joseph. They were married in 1854, but had become estranged long before her death. She was assassinated in Geneva, 10 Sept. 1898.

The only son of the imperial couple, the Crown Prince Rudolph, died mysteriously by violence in 1899 at his hunting lodge of Meyerling in company with the young Baroness Vetsera. His daughter, the Princess Elizabeth, after making a love match with Prince Otto of Windischgratz, quarreled with him and shot his mistress, an actress whom she found in his rooms at Prague. The emperor's daughter Gisela is the wife of Leopold, second son of Prince Luitpold, the late regent of Bavaria.

Three attempts were made to assassinate the emperor himself, but from all of them he escaped unscathed. The first was in 1853, when a Hungarian tried to cut his throat. Bystanders seized the man and he was hanged the next day. The second attempt took place 13 years later. The emperor attended a performance in the Bohemian Theatre in Prague. As he was entering a carriage after the performance a Bohemian in the crowd drew a revolver, but was struck down by a bystander before he could shoot. Every effort was made to hush up the attempt and no one was ever prosecuted for it. The third and last attempt upon the emperor's life was made in September 1882, when an effort was made to blow up the ruler with bombs at Trieste. A man named Overdank, the head of the conspiracy, was tried and executed for his share in it.

The emperor's last years, in addition to the dread of assassination and family troubles, were perplexed by dissensions in his empire growing out of its inchoate components and complicated system of government.

To his faculty as a linguist the emperor owed part of the great personal popularity that was his throughout the empire. Once when as a mere boy he had occasion to address a meeting of Hungarian nobles he won all their hearts by speaking to them in their own tongue, the Magyar.

The emperor's generosity had as much to do with his popularity as his ability as a linguist, and his gifts to charity were lavish. It has been estimated that his civil list was worth perhaps something approaching $5,500,000 a year, but the demands upon it were not infrequently greater still.

His golden jubilee was celebrated with great acclaim in 1908, the Kaiser and 11 German kings and reigning princes visiting Schoenbrunn Castle to congratulate the aged monarch. During the celebration an imperial rescript annexing Bosnia and Herzegovina was issued and acquiesced in by the powers. There were gala performances at the opera and the theatre and the time was one of popular rejoicing. Savage race riots occurred during the period in Bohemia and gave rise to the epigram that the longer the emperor lives the more his peoples love and hate each other.

To the end the emperor continued to live the life of simple habits formed in his youth. He rose early, went to bed early and dieted like the poorest of his peasants. To the end he continued to meet his people and to hear their grievances.

The last tragedy came when the heir apparent, Archduke Francis Ferdinand, was killed at Sarajevo, Bosnia, on 28 June 1914 by an assassin, and his wife, the Duchess of Hohenberg, was shot to death in the same attack. This caused the break between Austria and Serbia which precipitated the great European War of 1914.

Francis Joseph lived in turmoil, a leading figure in the wars of three generations; he left the field when the world is in the throes of the greatest conflict of history. He was succeeded by his grand-nephew Charles Francis Joseph (q.v.), son of the Archduke Otto, the younger brother of the slain Francis Ferdinand. Consult Emmar, J., ‹Kaiser Franz Joseph› (2 vols., Vienna 1898); Gribble, F., ‹Life of the Emperor of Austria› (New York 1913); Mahaffy, R. P., ‹Francis Joseph, His Life and Times› (London 1908); Schnitzer, J., ‹Franz Joseph I und Seine Zeit› (2 vols., Vienna 1899); Weindel, H. de, ‹François Joseph and His Time› (Paris 1905).

FRANCIS, Charles, eminent printer: b. London, 16 Feb. 1848. He learned the printing trade in Tasmania, returned to London as a young man, but later came to the United States and entered business in Chicago, Little Rock, Louisville, etc., and about 1890 came to New York city, where he founded one of the larger printing plants in America. In 1906 he founded the Printers' League, which later extended to nine leading cities and became the Printers' League of America. The organization, under Mr. Francis' leadership, developed the principles of «consultation, conciliation and arbitration» between employers and employed in the printing trade, and was extremely influential in doing away with the «strike» evil. In recognition of his services in stopping trade war, Mr. Francis was presented with a bronze bust by about 1,000 of his admirers in 1918, on the occasion of his 70th birthday anniversary, being the third American printer (after Benjamin Franklin and Theodore Low De Vinne) to be thus honored. He is the author of ‹Printing for Profit› (1918).

FRANCIS, Convers, American Unitarian clergyman and writer: b. West Cambridge, Mass., 1795; d. 1863. In 1815 he was graduated at Harvard College and entered the Unitarian ministry at Watertown. In 1842 he was appointed to the chair of pulpit eloquence at Harvard. His published works include ‹History of Watertown› (1830); ‹Life of Rev. John Eliot, the Apostle to the Indians› (1836); ‹Life of Sebastian Rale› (1848). Consult Newell, ‹Memoir of Convers Francis› (in Massachusetts Historical Society's Proceedings 1864–65).

FRANCIS, David Rowland, American politician: b. Richmond, Ky., 1 Oct. 1850. He was graduated from Washington University, Saint Louis, 1870, entered business and in 1877 established the firm of Francis Brothers, grain merchants, Saint Louis. He was mayor of Saint Louis 1885–89, governor of Missouri 1889–93, Secretary of the Interior under President Cleveland 1896–97, and became president of the Louisiana Purchase, Centennial Exposition in 1901.

FRANCIS, James Bichens, American hydraulic engineer: b. Southleigh, England, 1815; d. 1892. At 14 he was engaged on harbor work for a railway company. In 1831 he was employed on the Grand Western Canal, England; two years later he came to America and was at once engaged on the Boston and Providence Railroad under G. W. Whistler. With the latter he was engaged in 1834 in water-power development at Lowell and in 1837 succeeded Whistler as chief engineer for the proprietors of locks and canals on the Merrimac. From 1845 to 1884 he also served as agent and after 1884 was consulting engineer. In addition to the regular routine of building dams, conduits, locks, etc., he made vast experiments in hydraulic work, known as the «Lowell hydraulic experiments.» In 1855 appeared an account of these experiments. He wrote ‹Strength of Cast Iron Columns› (1865) and ‹Lowell Hydraulic Experiments› (later ed., 1883).

FRANCIS, Joseph, American inventor: b. Boston, Mass., 12 March 1801; d. Cooperstown, N. Y., 10 May 1893. He was the inventor of a number of life-boats and life-cars which came into general use and by means of which 200 persons were saved when the British ship *Ayrshire* was wrecked on the New Jersey coast in 1850. It is estimated that in four years as many as 2,150 lives were saved.

FRANCIS, M. E. See BLUNDELL, MRS. FRANCIS.

FRANCIS, SIR Philip, British statesman: b. Dublin, 22 Oct. 1740; d. London, 23 Dec. 1818. He is the best accredited of the candidates for authorship of the ‹Junius› letters. He entered the civil service, and was rapidly advanced, owing partly to his abilities and partly to personal influence curiously accordant with partialities shown in the ‹Letters.› Suddenly raised to the lofty position of one of the resident India council appointed by Parliament to control those affairs, he went out to India; spent his time there in a furious contest for supremacy with Warren Hastings; was finally vanquished, but achieved a terrible revenge after his return to England, by inciting Hastings' impeachment and coaching Burke; entered Parliament, prepared many pamphlets and made many speeches of much ability and unfailing acrimony. The ‹Letters› — savage assaults on the heads of the party in power, up to George III himself — appeared in the *Public Advertiser* of London from 1767 to 1772; ceasing with the dispersion of the party faction most liked by Francis, and a year before his great promotion and his departure from England. The case for his authorship is effectively put in Macaulay's ‹Essay on Warren Hastings.› See JUNIUS.

FRANCIS OF ASSISI, äs-sē-ze, **Saint,** Italian founder of religious order: b. Assisi, Umbria, Italy, 1182; d. Assisi, 4 Oct. 1226. Saint Francis of Assisi is the founder of the

Friars Minor, who are usually styled Franciscans (q.v.). His family name was Bernardone. At baptism he was called John. Whether it was because his father, who was a merchant, was at the time largely engaged in French trade, or because of the saint's own familiarity with the French language, the name Francis eventually superseded that of John. As a youth he was remarkable for his ardent piety and the spotless purity of his life, but is reproached with a worldly vanity in dress which his wealth enabled him to indulge in. A change of heart came over him in consequence of a year's confinement as a prisoner of war; a serious illness helping the transformation. He began to dispose of his property for the purpose of repairing dilapidated churches. Irritated by his extravagance his father treated him with the greatest cruelty; the trouble ending by the saint's abandonment of everything, even his worldly apparel, and he assumed the dress of a common laborer. His zeal for Church restoration grew in intensity, and being no longer able to devote his own patrimony to the work he obtained the necessary means by begging; he himself laboring at the buildings with his own hands. His affection was lavished also on the poor and especially upon lepers. He lived in the extremest poverty, practised the greatest austerities and for a time was looked upon as a madman. Distinguished and learned men, however, began to associate with him and follow his way of life. Though not a priest (and he never became one) he began to preach everywhere on the necessity of penance. As those were the days in which Barbarossa was raging against the Church, both religion and morality needed reformation and the preacher was eagerly listened to by all classes. When the number of his followers increased, the desire to institute a new religious order developed, and for that purpose he betook himself to Rome, but Innocent III, then sovereign pontiff, treated the proposal with indignation. Francis persevered, and the request was granted. The new community, known first as the Preachers of Penance, increased with astonishing rapidity, and at the first general chapter more than 5,000 friars assembled; some from the humble classes of life, others already famous in Church and State. The foundation of the order coincided with the great Lateran Council, the spirit of which was against the formation of any new religious order. In spite of this, however, there seemed to be a tacit consent to allow the new movement to proceed. It was when Pope Honorius finally gave the necessary authorization that Francis met the Spanish canon Dominic, who was in Rome to found his own Order of Preachers, commonly known as Dominicans (q.v.). The two saints met in church and instinctively recognized each other, becoming immediately most devoted friends. The visions and miracles reported of Francis are bewildering in their number and character. In the hope of martyrdom he made several attempts to preach the gospel to the Mohammedans. His prayer and austerities were continued, his ecstasies frequent, and while on Mount Alverno he received on his person what are known as the *stigmata,* namely, bleeding wounds on the hands, feet and side, corresponding to the marks on the crucified body of the Saviour. Wherever he went he was honored as a saint; and his preaching was irresistible in its pathetic and stirring appeals to repentance. The rule of life he laid down for his followers was based on the strictest poverty, that is, no property, and dependence on the alms of the faithful. This extreme rigor almost immediately brought dissension in the order. Parties were formed, and the Friar General Elias, who had been appointed by Francis, was its bitterest opponent, going so far as to leave the order and to side with Barbarossa, who was then in open warfare with the Church. Nevertheless, the friars continued to increase in number and to spread everywhere, preaching the gospel and carrying the faith into distant countries. Besides his order for men, he established another for women, commonly known as the Poor Clares, so called from Saint Clare, the first superior. There is still another section called the Third Order of Saint Francis, for men and women living in the world, who follow a mitigated and adapted form of the rule of the friars. All three have given a vast number of saints and scholars to the Church. Francis died at the age of 45, 19 years after the establishment of his order. The extreme beauty, simplicity and amiability, and perhaps the poetry, of the saint's character, but especially his love of created nature, have had the effect in our own days of developing a singular cult for him on the part of many outside the Catholic Church. The movement was started by Paul Sabatier, a French Calvinist minister, and Franciscan societies for the study of the life of the saint and of everything connected with him have been established in several countries of Europe.

Bibliography.— Segur, 'Popular Life of Saint Francis'; Saint Bonaventure, 'Life of Saint Francis'; Thomas de Celano, 'Life of Saint Francis'; 'Franciscan Annals.'

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FRANCIS DE SALES, sälz, Fr. säl, **Saint**, French prelate, founder of the Order of Visitation: b. of a noble Savoyard family, in the château of Sales, near Geneva, 21 Aug. 1567; d. Lyons, 28 Dec. 1622. He was educated by the Jesuits at Paris, studied law at Padua, and having a strong bent to theology and a religious life, entered the Church. Earnest and successful as a preacher, he was sent in 1594 with his kinsman, Louis de Sales, to preach in the duchy of Chablais, and bring back, if possible, to the Roman Catholic Church the followers of Calvin. He had a large measure of success. His conferences with Théodore de Bèza, Calvin's successor, at Geneva, were, however, without result. He went to Paris in 1602, preached there with great success and steadily refused the offers of dignities made by the French king. The same year he was appointed bishop of Geneva, and taking Saint Charles Borromeo as his model, applied himself zealously to the reform of the diocese and its monasteries. He was disinterested and free from worldly ambition, and declined the offer of a cardinal's hat and the renewed invitations of the king of France. In 1610 he founded the Order of the Visitation, of which the first directress was his friend, Madame de Chantal. His best-known works are the 'Introductions to a Devout Life,' which has been translated into many languages, and 'A Treatise on the Love of

God.› He was canonized by Pope Alexander VII in 1665. Consult ‹Life› by Camus.

FRANCIS XAVIER, zăv'ĭ-ėr, Fr. ksăv-ē-ā, Saint, Spanish Jesuit missionary: b. Castle of Xavier, Navarre, 7 April 1506; d. Island of Sancian, 2 Dec. 1552. Saint Francis Xavier was born in Spain, of one of the noblest families of the kingdom of Navarre. After the usual collegiate studies in his own country, he went to Paris for a course of philosophy in the university. In spite of his extreme youth, his extraordinary ability secured for him a professorship in the affiliated College of Beauvais. It was in Paris that he met the man who shaped his destinies, Ignatius of Loyola (q.v.). Abandoning his professorship, he took up the study of theology, practised the rudest austerities, bound himself to a life of evangelical poverty, chastity and obedience, and with Ignatius and five other companions established what is known as the Society of Jesus.

The original purpose of this organization was to evangelize Christians living in the Mohammedan countries of the East. Failing in that, they offered themselves to the Pope and were employed by him in most responsible trusts in various parts of Europe, which, however, they combined with labor in pest houses, prisons and among the abandoned poor. A demand coming from John III of Portugal for 10 missionaries to evangelize the new Portuguese possessions in India, Francis Xavier was chosen, but went alone, invested with the dignity of Apostolic Nuncio, a dignity which he sedulously kept out of sight.

The day after the command was given, he left Rome for Lisbon, making the journey on foot, preaching and teaching on the way. In Portugal his influence was so instantaneous and so great that the king purposed to keep him in his dominions. But Xavier set sail for the East, 7 April 1541, having refused even to see his own relatives before leaving. The journey meant more than a year of great suffering, and he reached Goa only on 6 May 1542. The ignorance and immorality which prevailed there were deplorable and a complete and immediate revolution in conditions followed his arrival.

Then began his series of amazing apostolic journeys. They can only be appreciated by recalling the methods of travel of those days; the perilous character of the seas through which he continually sailed, and the savage or barbarous nature of the people he had to evangelize. From Goa he went around Cape Comorin and Ceylon, then back to Goa, then through every principality of Hindustan, off through the scattered islands of the coasts, until he reached the distant Moluccas; establishing missions everywhere, and managing all the complicated and multiplied works which necessarily resulted. The story of his life is simply a series of surprising evangelical conquests, bringing thousands to Christianity by the efficacy of his preaching, the prodigies he wrought and the extraordinary sanctity of his life.

On 15 Aug. 1549 he reached Japan. He remained there only two years and four months, but succeeded in penetrating almost all the little kingdoms into which the country was then divided; breaking down the opposition of the Bonzes who were the chief enemies of the Gospel, winning vast numbers to the faith, and establishing his followers in the favor of both rulers and people. The sway which he exerted over the Japanese mind may be inferred from the reverence with which he is still regarded there. The thoroughness with which he and his successors taught Christianity is evidenced by the fact that 25,000 Catholics were found in Japan after three centuries of persecution. They had handed down the faith from father to son without any ecclesiastical ministrations.

To obtain laborers for this new field he returned to Goa in 1551. We then find him venturing on a new project, attempting to win China to Christianity. Its conversion he thought essential for the maintenance of the faith both of India and Japan; for the corrupting influences in both those places he considered to be largely due to their relationship with China. He never reached that country but died on the Island of Sancian, about six leagues from Canton, being only 46 years of age. This last fatal voyage had lasted nine months.

His entire apostolate in the East extended only 10 years, but he is said to have planted the faith in 52 kingdoms, preached the Gospel through 9,000 miles of territory and baptized more than 1,000,000 persons. Fifty years after his death Pope Paul V by a bull, dated 25 Oct. 1605, declared him blessed, and, 16 years subsequently, Gregory XV canonized him, but on account of the pontiff's death, which occurred just at that time, the bull of canonization was issued by Urban VIII on 6 Aug. 1623. He is honored in the Church on 3 December and is usually styled «the Apostle of the Indies.» The devotion to him is universal and countless churches are erected under his invocation. His relics are still preserved in Goa, and in 1859 the body was found to be incorrupt.

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FRANCISCANS, the designation borne by the members of the three great religious orders founded in the 13th century by Saint Francis of Assisi. The first of these orders is that of the Friars Minor, known as the Greyfriars, and in France as the Cordeliers. The second order is that of the Poor Clares, called in Italian *Povere Donne* (Poor Ladies), and in France the Clarisses. The third order is that of Penance, or Tertiaries.

Saint Francis, keenly alive to the evils which in his day seemed to threaten the very existence of the Church and society, strove to counteract their baneful influence by establishing an order, the members of which were to observe the most absolute poverty, and to be devoted to the service of the Church. The goal which he aimed at was to reproduce the ideal of the divine life on earth, therefore neither he nor his were to possess anything temporal, but were to go about doing good and preaching to all the world the kingdom of heaven. A little band of disciples to the number of seven, aglow with enthusiasm, gathered around the saint, and the little chapel of Sta. Maria degli Angeli, near Assisi, which he called Portiuncula, «the little portion, or inheritance,» was the place where the order was first planned. It was truly a humble origin, an insignificant beginning, but Francis had a presentment of the future world-wide extension of his order. In 1210 he obtained from Innocent III a verbal approbation of the rule he had drawn up for it. Forthwith it appeared how accurately he had gauged the wants of his age, for his order sprang at a bound into popular favor. So rapid was its growth that 10 years afterward, at a chapter held near Assisi, more than 5,000 of his religious assembled, and not half a century had elapsed when they counted missionaries in every known country, as may be learned from a bull of Alexander IV in 1258. In 1260, when a chapter presided over by Saint Bonaventure was held at Narbonne, the order had 1,400 houses. At the dissolution of the monasteries in England there were 65 houses of Franciscans and even in 1680, in spite of severe losses in Protestant countries, the order numbered 100,000 members. The order is ruled by a general minister, who, with his council or *definitorium,* resides in Rome. It is divided into provinces to govern which provincials are elected. Each province is composed of a certain number of houses or convents, whose superiors are termed guardians.

Owing to the absolute nature of the poverty prescribed by the second rule drawn up for the first order and approved by Honorius III in 1223, some of Saint Francis' immediate followers showed tendencies inimical to it even in the saint's lifetime. After his death these tendencies became more marked, and were covertly connived at and effectively encouraged by the second minister-general, Elias of Cortona. This was the rift in the lute which widened as time went on. Some zealous upholders of the purity of the rule, such as Saint Anthony of Padua, Adam de Marisco, Cæsar of Spires, protested against all innovations, and labored strenuously to maintain intact their sacred inheritance, receiving the distinctive name of Cesarines, but eventually returning to the body of the order in 1256. Other reforms were initiated, such as that of Peter of Macerata, 1294; that of Philip of Majorca, 1308; that of John of Vallées, 1336; and others. They met with varying success, until in 1415 a final split took place, one section of the order adopting the mitigations which had been introduced in the matter of poverty, this being the bone of contention all through. They became known as the Conventuals, while the members of the other section were called Observants, as observing faithfully the Franciscan traditions. These latter still adhere strictly to the original austerity of their rule. Saint Bernardine of Sienna, Saint John Capistran and Saint James de la Marcha were mainly instrumental in promoting the interests of the Observance. In 1517 Leo X issued his famous bull, *Ite et vos in vineam meam,* decreeing that a general minister of the whole order was to be chosen from among the Observants, and that the Conventuals were to elect a master-general. The Observants, however, did not satisfy the zeal of some, and thus we find certain groups, such as the Reformati, originating in Italy; the Alcantarines, or those who follow the reform of Saint Peter of Alcantara, in Spain; and the Recollects.

There were now the two great families of the first order, the Observants and the Conventuals, these latter being governed, as said above, by a master-general, and notwithstanding their dispensations in regard to poverty, they have always rendered important services to the Church. The great Pope Sixtus V was himself a Conventual. In 1525 there arose a third family, known as the Capuchins (q.v.).

The Franciscans did not devote themselves exclusively to the apostolic life. From the first they took an active and leading part in the study of Holy Scripture and in all the branches of sacred and secular learning. They have filled with honor the first chairs in the most celebrated universities. Such great names occur among them as Alexander of Hales, Saint Bonaventure (“the Seraphic Doctor”), Blessed John Duns Scotus, called “the Subtle Doctor,” who as defender of the Immaculate Conception became the leader of the Franciscan school, Francis Mayronis and Nicholas de Lyre. In England during the centuries immediately preceding the Reformation, there were 67 friars professors at Oxford and 73 at Cambridge, among them being Adam de Marisco, Duns Scotus, Roger Bacon, the pioneer of the modern discoveries in the physical sciences. Thomas de Celano, who wrote ‘Dies Iræ,’ and Jacopone da Todi, author of ‘Stabat Mater,’ were Franciscans. Nuncios, legates, archbishops, many cardinals and several popes have been chosen from among the Franciscans.

The relations of the Franciscans with America began with its very discovery. Father Juan Perez, guardian of the Franciscan monastery at La Rabida, the adviser and personal friend of Columbus, with several companions, accompanied the discoverer in 1493. The first convent was erected for them at what is now the city of Santo Domingo, on Haiti; another arose at La Vega, on the same island. Connected with these convents were the first schools in the western hemisphere.

Owing, to the enthusiasm among the religious in Spain, and to the docility of the Indians, the order spread so rapidly in the West Indies that King Ferdinand found it advisable to issue a decree forbidding the erection of a new convent except at a distance of at least five leagues from one already existing. In 1505, only 13 years after the discovery, there was a sufficient number of convents to form a province, under the name of Holy Cross. The first diocese to be erected was Santo Domingo, in 1504; its first bishop was Father Juan de Padilla, a Franciscan.

After the Spaniards had set foot on the mainland, the king, ever anxious for the spiritual welfare of the aborigines, sent over a great number of friars under the leadership of Father Juan de Quevedo, who was appointed bishop of Darien, the first bishop on the American continent. The Franciscans entered Venezuela in 1508, Brazil in 1519; in 1535 they were able to form a province in Peru, whence were founded the missions farther south in the Andes and Pampas. Saint Francis Solanus, called the Apostle of Peru on account of his extraordinary missionary labors, evangelized these regions; he died at Lima in 1610.

In 1521, if not before, the first Franciscans came to Mexico. Together with 12 friars known as the Twelve Apostles of Mexico, there labored here from 1533 to 1572 the famous Brother Gante. He wrote a catechism in the

Aztec language, erected over 100 churches and with one companion frequently baptized 8,000 Indians in one day. Many schools were erected, in which often as many as 600 and 800 boys received an elementary education. Owing to their stainless lives, abstinences and contempt for gold, the friars obtained marvelous results among the natives. In 1535 the 70 convents in Mexico were organized into a province. At the end of the 16th century there were three provinces; others have been formed since then, besides several missionary colleges, whence zealous missionaries set out to convert the natives to the north, notably in Florida, New Mexico, Arizona, Texas and California.

Florida was the first of the States that beheld the Franciscan garb. Five friars came with Narvaez in 1528; their superior, Father Juan Suarez, was the first bishop in the United States. In the course of time the missionaries succeeded, though not without heavy sacrifices of life and labor, in establishing flourishing missions all along the coast and in the interior as far west as Mississippi and as far north as Georgia. In 1634 there were 34 friars, who maintained 44 mission stations, where they attended to about 30,000 converts. These missions suffered greatly by invasions from Carolina and Georgia, and when Florida was ceded to the English in 1763 they ceased to exist

Arizona and New Mexico were first visited by Franciscans in 1539; in the course of time a great many missions and churches were established, to most of which were attached schools for boys, as we learn from an official report of 1632. Beginning with 1689, about 160 friars labored in Texas up to the time of the Mexican independence, when the missions were ruined.

The Franciscans came to California in 1768 under the renowned Father Junipero Serra. The first mission founded was San Diego. Up to 1823, 21 missions were organized, forming a chain which extended a distance of over 700 miles. At the height of mission prosperity 30,000 Indians lived under the paternal guidance of the friars; they were fed, clothed and educated, with no expense to the government, the missions supporting themselves by agriculture and stock-raising; everything was manufactured at these establishments by the Indians. In 1834 the Mexican government began to confiscate the missions and took them from the control of the friars; this work was finished by 1846 and brought about the complete destruction of the once so flourishing missions.

While the Spanish Franciscans were thus extending their labors in the south from the Atlantic to the Pacific, other bands of Friars Minor were emulating their example in the north. Champlain induced the French Franciscans, formerly called Recollects, to come to Canada as early as 1615. Thence they penetrated into Maine, New York, Pennsylvania, Michigan, Illinois, Minnesota and Wisconsin. The best known of these missionaries is Father Louis Hennepin. He accompanied La Salle on his expeditions, and was the first to publish a description of the Niagara Falls. While a captive among the Sioux he saw and named the Falls of Saint Anthony. About this time we find the English Franciscans laboring in Maryland and adjoining colonies for full half a century. In the beginning of the 19th century the Rt. Rev. Michael Egan, a Franciscan and first bishop of Philadelphia, intended establishing a province of his order in Pennsylvania, but he died before accomplishing his design. In 1845 Franciscans from the Tyrol came to Cincinnati; in 1854 Italian friars formed a community in western New York, and in 1858 German friars settled in Illinois. The «Kulturkampf» was the cause of many more coming to the United States.

At present there are in the States about 1,200 Franciscans, who are distributed throughout the country. Most of these friars are engaged in regular parish work; some preach missions throughout the States; others are on the Indian missions in Michigan, Wisconsin, California, Arizona and New Mexico. They also conduct one seminary (Allegany, N. Y.) and six colleges (Allegany, N. Y., Cincinnati, Ohio, Teutopolis, Ill., Quincy, Ill., Pulaski, Wis., Santa Barbara, Cal.).

The Conventual Friars Minor came to the United States in 1851, and at present form a province in New York and New Jersey numbering about 125 members. Besides these there are in the States 134 Franciscan Brothers and some 7,800 Sisters, all belonging to the third Order of Saint Francis. In 1897 the four above-mentioned groups, namely, Observants, Reformati, Alcantarines and Recollects, who had always been under the same minister-general, dropped their distinctive traits and are now known simply as Friars Minor or Franciscans. They number at present about 17,000.

Consult Shea, 'Catholic Church in the United States'; Hammer, 'The Franciscans in America'; Engelhardt, 'Franciscans in California'; 'Franciscans in Arizona.'

Rev. P. Hugoline Storff, O.F.M.

FRANCK, Adolphe, French philosopher: b. Liocourt, department of the Meurthe, 9 Oct. 1809; d. Paris, 11 April 1893. Finding his proper field in philosophy after attempts in other directions, in 1832 he taught in various colleges and in 1840 at Paris, beginning in the same year a course of public lectures at the Sorbonne. In 1842 he became assistant curator of the Bibliothèque Royale, and soon after began his chief work, 'Dictionnaire des Sciences Philosophiques.' In recognition of his 'Esquisse d'une Histoire de la Logique' and his book on the Cabala (translated into German in 1844 by Adolf Jellinek), he was elected in 1844 member of the Institute de France. In 1847 he started at the Sorbonne a course in social philosophy, and in 1856 became professor of natural and civil law, holding the position for 30 years. He founded *Paix Sociale,* the organ of the Anti-Atheist League, and was president of the Société des Études Juives in 1888. Among his best-known works, in addition to those already mentioned, are 'Études Orientales' (1861); 'Reformateurs et Publicistes de l'Europe' (1863–93); 'La Philosophie Mystique en France au XVIII Siècle' (1866); 'Le Capital' (1871); 'La Religion et la Sciènce dans le Judaïsme' (1883); 'Essais de Critique Philosophique' (1885); 'Nouveaux Essais' (1890).

FRANCK, César Auguste Jean Guillaume Hubert, sā′zar ō-güst zhŏṅ gē-yŏm übăr, fränk, French composer: b. Liège 1822; d. Paris 1890. He studied in the conservatory of his native town and at Paris, and in 1872 succeeded his master, Benoist, as teacher in the Metropolitan Conservatory. His talent as a composer was for a long time unrecognized, and in 1846 his oratorio ‘Ruth’ fell flat. Twenty years later it was revived and created a furore, and Franck found himself leader of a new school. The popularity which his works still enjoy at Paris has to some extent spread to the United States, where his oratorio ‘Les Beatitudes’ has been much appreciated.

FRANCK, or **FRANK, Sebastian,** German humanist and reformer: b. Donauwörth, c. 1499; d. Basel, c. 1543. He was educated for the Catholic priesthood, studying at the universities of Ingoldstadt and Heidelberg. Ordained in 1524, he held a curacy near Augsburg, but the following year joined the Reformation party at Nuremberg and became Protestant preacher at Gustenfelden. In 1518 he had attended the Augsburg Conference, and had met Luther, Bucer and Frecht, who were to exercise a considerable influence on his writings. Besides translations and editorial work, he published in 1528 a treatise against drunkenness which gained considerable popularity. He signed himself Frank von Wörd after his native city, Donauwörth. His liberal religious ideas, however, antagonized the authorities, and he removed from Nuremberg to Strassburg in 1529 where two years later he published his chief work, ‘Chronica, Zeitbuch und Geschichtsbibel’ (1531). Freedom of thought, broad tolerance in connection with a universal but invisible spiritual Church, ideas far in advance of his age, expressed in clear, forcible, direct language, again brought him official condemnation, Luther even describing him as a «devil's mouth.» His life henceforth witnessed a series of polemical vicissitudes, with removals to Esslingen, Ulm, and finally Basel. ‘Weltbuch’ (Tübingen 1534) supplemented the ‘Chronica’; the same year appeared ‘Paradoxa’ (Ulm 1534; new ed., 1542), followed by ‘Guldin Arch’ (Augsburg 1538); ‘Germaniæ Chronicon’; (Frankfort 1539); ‘Kriegbüchlein des Friedens’ (pseudonymous, 1539); ‘Schrifftliche und ganz gründliche Auslegung des 64 Psalms’ (1539); ‘Das verbütschierle mit sieben Siegeln verschlossene Buch’ (1539); ‘Spruchwörter’ (1542; new ed. by Guttenstein 1831). Consult Hase, C. A., ‘Sebastian Franck von Wörd’ (1869); Tausch, E., ‘Sebastian Franck von Donauwörth und seine Lehrer’ (1893).

FRANCKE, frän'kė, **August Hermann,** German Lutheran clergyman and philanthropist: b. Lübeck, 22 March 1663; d. Halle, 8 June 1727. In 1692 he obtained the professorship of Oriental languages at Halle, which in 1698 he exchanged for that of theology. A pupil of Spener and the teacher of Zinzendorf, Francke belonged to the ranks of those who carried forward the pietistic movement; his activity, however, took the practical direction of founding, endowing and organizing various educational institutions at Halle. Among these were a school for the poor, a pedagogium, a burgher school, a Latin school and a seminary for training teachers for these establishments, all founded in one year, 1695; and with them was associated an orphanage, which became in the course of time the most important of all Francke's institutions. At the time of his death his schools were frequented by more than 2,300 pupils. Francke's principal aim was religious instruction, but he founded also a printing-office, and an apothecary's shop, and taught natural science and physical exercises and manual trades.

FRANCKE, Kuno, German-American educator and author: b. Kiel, Germany, 27 Sept. 1855. His life work became associated with Harvard University, where he was instructor from 1884–87; assistant professor of German 1887–92, and of German literature 1892–96; professor of history and of German kultur from 1896; and curator of the Germanic Museum from 1902. He received his early education at Kiel gymnasium, graduating in 1873, and at the University of Munich, attaining his Ph.D. in 1878. He received the degrees of LL.D. University of Wisconsin 1904, and Litt.D. Harvard University 1912, and from the German imperial government the title of Chevalier Royal Prussian Order Red Eagle and Order of the Crown. His early works published in Germany include: ‘Zur Geschichte der Schulpoesie des 12 Jahrhunderts’ (1878); ‘De Hymno in Cererem Homerico’ (1880); ‘Libelli de Lite Imperatorum et Pontificum’ (1892). After settling in the United States he published ‘Social Forces in German Literature’ (1896); ‘Glimpses of Modern German Culture’ (1898); ‘History of German Literature’ (1901); ‘Handbook of the Germanic Museum’ (1906); ‘German Ideals of To-day’ (1907); ‘Die Kulturwerte der deutschen Literatur des Mittelalters’ (1910); ‘A German-American's Confession of Faith’ (1915); ‘Personality in German Literature before Luther’ (1916); ‘The German Spirit’ (1916); editor-in-chief ‘The German Classics’ (1914).

FRANCKEN, Frans, fräns fränk'ĕn (called THE YOUNGER), Flemish painter: b. Antwerp, May 1581; d. there, 6 May 1642. After a trip to Italy he was received into the Guild of Saint Luke at Antwerp, where he worked at first in the brilliant colors of the old masters and later in the realistic style of Rubens.

FRANCKEN, Frans (called THE THIRD), Flemish painter: b. Antwerp 1607; d. there, 2 Sept. 1667. He was admitted to the Guild of Saint Luke in 1639. His works, patterned after Rubens, are unsigned and therefore difficult of identification. Specimens of his religious subjects are to be seen at Augsburg (‘Moses Striking Water from the Rock’) and Vienna. He was the last of the Francken family of 11 Antwerp painters whose works date from the 16th and 17th centuries. He was the son of Frans Francken (THE SECOND), b. 1581; d. 1642; among whose paintings are ‘Christ Washing the Apostles' Feet,’ in the Berlin museum; ‘The Abdication of Charles V,’ formerly attributed to Hieronymus Francken, in the Amsterdam museum; and ‘Works of Mercy,’ in the Antwerp Museum. Works of the latter's father, Frans Francken (THE FIRST), b. 1542; d. 1616, are in the Louvre, Paris, in the museums of Antwerp, Dresden and Vienna, and his ‘Christ among the Doctors’ was the altarpiece of Antwerp Cathedral. The latter's elder brother, Hieronymus Francken, b. 1540; d. 1610; became court painter to King Henry III of France and decorated the palace of Fontainebleau; he is represented in the Dresden museum by ‘The Beheading of John the Baptist.’

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